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SEA-SICKNESS

AND

...OW TO PREVENT IT:

AN EXPLANATION OF

ITS NATURE AND SUCCESSFUL TREATMENT,

THROUGH THE AGENCY OF THE NERVOUS SYSTEM, BY MEANS OF

THE SPINAL ICE BAG.

WITH AN INTRODUCTION ON THE GENERAL PRINCIPLES OF

NEURO-THERAPEUTICS.

BY

JOHN CHAPMAN, M.D.

M.R.C.P., M.R.C.S.

PHYSICIAN TO THE FARRINGDON DISPENSARY.

SECOND EDITION, ENLARGED.

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The following passages are extracted from this 'Letter:'—

"A right appreciation of the claims of medical science and a due regard for the public welfare have conjointly necessitated professional repudiation of men who deal in secretly compounded or quack-medicines, as well as earnest reprobation of the custom, so long as it was continued, of protecting such medicines by royal letters-patent. . . . But the same cannot be said of the grant of an excusive privilege, for a term of years, of making and vending a surgical instrument, or any mechanical apparatus for a medical purpose. This privilege involves no secrecy: any one can make medical or surgical apparatuses for accomplishing the same purposes as those for which the patented articles are designed; the mode of their construction is not and cannot be concealed; and all the privilege the patent confers is that of an exclusive right for a term of years of making the patented article . . . . And I am constrained to affirm that in so far as the policy, the expediency, the morality, the dignity, in short, the principles generally approved by the profession,' condemn the 'patenting of [mechanical] inventions in connexion with medicine,' precisely so far do they condemn the holding of copyrights in medical and surgical books, and in the titles of medical journals—that of *The British Medical Journal* [which, after publicly condemning me, refused to publish my justificatory reply] not excepted. All professional proprietors of such books and journals can only be at once logical and consistent either by cordially recognising the right of their professional brethren to patent any apparatus devised by them for surgical or medical purposes, or by surrendering their copyrights *pro bono publico*. If within the pale of the profession there should be a third party the members of which are so very 'pure' as surgeons or physicians that they regard the Copyright Law as a 'stumbling-block,' and those who avail themselves of it as an 'offence,' I beg humbly to suggest to such persons that they ought to give their advice gratis to all who ask it. For what is the meaning of a patent or a copyright? Obviously no other than to secure to each man a right of property in the product of his own brains. Is he wrong in availing himself of this right? If so, then the 'pure' physicians and 'pure' surgeons are equally wrong in refusing to allow the public to profit freely of their advice without paying for it. I believe, however, that these dignitaries of the profession, who, according to its avowed 'principles' rigorously interpreted, ought to practise their calling without seeking for fee or reward, do indeed exact the largest fees demanded by any member of the medical body!"—(Pages 6, 10, and 11.)

"Dr. CHAPMAN is at war with the faculty on a point of etiquette, or, as those who consider the question a grave one would say, a point of ethics. . . . Of course the traditions of the faculty, the spirit of conservatism, and so forth, all tend to oppose the patenting of medical instruments; but beyond these motives of prejudice we see no logical objection to the practice. . . . It certainly appears hard and unfair that the fruit of a man's brains should fall into the hands of a trader —as in the case of Dr. RICHARDSON'S *un*patented Spray-producer—and that the original inventor should only be rewarded with barren honour. It seems to us, therefore, that Dr. CHAPMAN'S arguments are in the main perfectly reasonable; and we cannot but think that the medical journals have displayed a feeling quite out of accordance with the true spirit of the press in refusing insertion to Dr. CHAPMAN'S letter."—*London Review*, Nov. 2nd, 1867

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PREFACE.

THE call for a second edition of this book has given me an opportunity of improving it in three respects: *first*, the introductory exposition of those novel pathological and therapeutical doctrines which my method of preventing or curing sea-sickness practically illustrates, is far more complete than it was in the first edition; *secondly*, I have added a section on the Physiology of Vomiting; and, *thirdly*, the number of cases which I have adduced in evidence of the reality of my discovery of a remedy for the disease which has hitherto been the terror of the great majority of travellers by sea, is more than double that of those published in the first edition.

The time is not yet come for the publication, or even the preparation of a systematic work on Neuro-therapeutics; for the principles and practice of healing intended to be implied by that term need first to be experimentally illustrated in respect to several groups of diseases in the treatment of which they are applicable, but which have not yet been treated by suitable applications of cold or heat to the spine. Meanwhile, as the introductory section of this work contains an explicit statement of the principles in question, and a considerable array of evidence from independent medical observers, both of the truth of those principles and of the great and widely-extensive remedial power which has been developed from them, it will, I hope, be found a sufficient guide and encouragement to such professional inquirers as may desire to acquaint themselves theoretically and practically with the therapeutical method in question.

The section on the Physiology of Vomiting will be found, I believe, to throw some new light on the obscure and difficult question of the parts played by the medulla oblongata and spinal cord respectively in the process of vomiting, and will, I think, suggest the direction in which further research is most likely to be rewarded by additional knowledge of the subject.

The number of cases given in proof that the spinal ice-bag will prevent or cure sea-sickness might have been much greater than it is if since the publication of the first edition of this book my attention had been especially directed to the subject; but during the intervening four years I have been chiefly occupied in investigating and working out the applicability of the neuro-therapeutical method to the treatment of disease in general, and particularly to the treatment of diarrhœa, cholera, and those three extensive groups of terrible and hitherto generally incurable maladies—convulsive, paralytic, and neuralgic affections. The reports of the cases of sea-sickness treated by means of ice which have been added to those published by me in 1864, have been mostly communicated to me by the kindness of friends or patients: happily, the success of the treatment is now so thoroughly established that no additional experiments by myself or others are needed for this purpose; but as every additional proof of the reality of the discovery of a remedy for sea-sickness, which until treated by means of the spinal ice-bag had utterly baffled all the efforts of physicians, will be an additional force with which to convince the travelling public that that terrible malady need be endured no longer, I venture, on public grounds, still to ask those who make use of the remedy to be kind enough to report to me as exactly and circumstantially as possible the results of their experiments. By thus helping to hasten the general adoption of an expedient by which an unspeakably vast amount of human misery may be prevented, they will be public benefactors.

JOHN CHAPMAN.

LONDON, 25, SOMERSET STREET,
PORTMAN SQUARE, W.,
Oct. 6, 1868.

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Section I.

INTRODUCTION:

*General Principles of Neuro-Therapeutics.**

The discovery that the sympathetic nerve causes the contraction and permits the dilatation of bloodvessels, and the establishment of the doctrine that the main force effecting the circulation of the blood is a chemical one (consisting in the attractions exerted, in the case of the pulmonary circulation, between the inspired air and the venous blood, and, in the case of the systemic circulation, between the tissues and the arterial blood), inaugurated a new era in physiology, and gave promise of one in therapeutics.

No philosophical physician who recognises these two important truths can fail to discern that if the power of stimulating or restraining the generation of nervous force in the sympathetic ganglia be once attained, the power of increasing or decreasing the diameter of the bloodvessels, and consequently of facilitating or retarding those chemical changes which constitute nutrition and decay in each part of the body, will have been attained also. No man has foreseen this great result more clearly than Dr. Brown-Séquard, who, in one of his lectures delivered at the Royal College of Surgeons in 1858, said:—I consider that the knowledge of the effects of the paralysis and the irritation of the sympathetic nerve opens a new and most important field in physiology, in pathology, and in therapeutics." But, distinctly as he foresaw and foretold the revolution possible in the science of medicine whenever an adequate controlling power over the sympathetic nerve should be acquired, he had no conception of any such power within reach of the physician.† It is true that in 1863, at the

* This Section, is reprinted, with additions, from *The Lancet* of June 4th, 1864.

† We know that strychnine increases the capacity of reflex action in the spinal cord, and it is inferred that it does this, in part at least, by increasing the diameter of the bloodvessels, and therefore the nutrition, of that organ. This inference is, however, open to question; and, so far as I am aware, no evidence has yet been tendered that strychnine has the power of inducing the

Hospital for the Paralysed and Epileptic, he stated that, in order to overcome the spasmodic contractions of the cerebral arteries constituting the first phase in a fit of epilepsy, he was entertaining the idea of paralysing the cervical sympathetic nerve by dividing it; but though an exceptionally heroic patient might be found willing to undergo such an operation, I apprehend few physicians would be found willing to advise it.

While attending the practice of Dr. Brown-Séquard, at the Hospital for the Paralysed and Epileptic, in Queen-square, I became impressed with the conviction that in proportion to the number of patients suffering from paralysis or epilepsy the number of cures was lamentably small (although the institution had the help of one of the most distinguished physicians in Europe), and that, with respect to many forms of paralysis, and nearly all forms of epilepsy, a hitherto insoluble problem demanded solution before the physician could be permitted to hope for the power of treating those diseases with any considerable success. That problem presented itself to my mind thus:—"By what means can the quantity of blood circulating in the spinal cord, including the medulla oblongata, and in the ganglionic nervous centres, be most effectually increased or lessened?" In the latter part of 1862 the idea occurred to me that this problem might be solved by modifying the temperature of the parts in question, and that this could be done by means of cold or heat applied along the centre of the back. During the first half of 1863 I tried the efficacy of this method in numerous cases, and had the satisfaction of finding that the remedial power which had hitherto existed only as an idea occupying my mind day and night for months, was an indubitable reality.

Until the date of my experimental demonstration that the circulation of the blood may be increased by cold applied to the back, it was held that, as a rule, cold thus applied for any considerable length of time was dangerous; and hence, as no one ventured to experiment in this field of alleged peril,* the extent

dilatation of bloodvessels in any other part of the body. The medicines chiefly relied upon to lessen the diameter of the bloodvessels are belladonna and ergot of rye: the extent to which these drugs are capable of thus acting is matter of grave uncertainty; indeed, their mode of action is not understood, and if they do increase the force-generating power of the sympathetic ganglia, they do not do so in suchwise as obviously to lessen the circulation in either the viscera or the limbs.

* On the mistaken assumption that, *as a rule*, cold applied to the back "has a very powerful influence in diminishing both the force and frequency of the heart's

of the remedial power, even so far as the spinal cord alone is concerned, which consists in modifying the temperature of the back, remained unknown. Now I have proved by numerous experiments that cold applied to the back not only exerts a sedative influence (a "depolarizing" influence, according to Dr. Todd) on the spinal cord, but also on those nervous centres which preside over the blood-vessels in all parts of the body. The *modus operandi* of this influence on those centres and its effects may be thus stated:— 1st. It partially paralyses them. 2nd. By means of the partial paralysis thus effected it lessens the nervous currents in the vaso-motor nerves emerging from the ganglia or nerve-centres acted upon and stimulating the muscular fibres surrounding the arteries influenced. 3rd. By thus lessening those currents, it lessens the contractile energy of the muscular bands of the arteries to which those currents flow, and by doing so facilitates the dilatation of the arteries themselves. 4th. By thus inducing the condition

action," Dr. Todd expressly warned his pupils thus: "For this reason you must not apply it for too long a time, or over too great an extent of surface; you must watch your patient, and remove and re-apply it as his condition shall indicate." A curious illustration of how one error leads to another is presented in Dr. Fuller's work on "Diseases of the Chest," p. 267. Referring to the treatment of pulmonary hæmorrhage, he says: "My own experience leads me to testify most strongly in favour of repeated dry cupping, aided by the application of ice down the spine, and by the internal administration of full doses of digitalis." Assuming the truth of Dr. Todd's doctrine as to the effects of ice down the spine, Dr. Fuller's application of it is at once logical and ingenious; but I am prepared to prove that of all agents used as remedies, whether internally or externally, there is none so capable of predisposing to hæmoptysis, if not of actually inducing it, as "the application of ice down the spine." Were Dr. Fuller to depend on it alone, in treating hæmoptysis, instead of combining it with dry cupping and digitalis, he would soon see how dangerously he has been misled. Fortunately, he averts the evil influence of "ice down the spine" by dry cupping and digitalis, and thus one part of the treatment neutralizes the effects of the other. Heat properly applied between the scapulæ will stop hæmoptysis, and will often in a few minutes disperse the pulmonary congestion which frequently preludes it.

[The foregoing note appeared in the first edition of this pamphlet. But at the Harveian Society, Nov. 21st, 1867, Dr. Fuller, referring to a paper which I had just read on *Neuralgia: its pathology and treatment*, "avowed himself a believer in spine-bags, the efficacy of which he had over and over again experienced in certain cases of menorrhagia; and invited Dr. Chapman to name the different kinds of cases in which he had found the spine-bags to be especially useful" (*Medical Press and Circular*, Dec. 11th, 1867). It is scarcely likely, therefore, that now in treating hæmoptysis Dr. Fuller would apply ice along the spine; for inasmuch as he is among the first physicians who have applied heat along the lumbar vertebræ to stop uterine hæmorrhage, the principle which has led him to do so will, I presume, also induce him to arrest pulmonary hæmorrhage by applying heat along the dorsal vertebræ.]

of easy dilatability in the arteries acted upon, it enables the blood, which flows in the direction of least resistance, to enter them in greater volume and with greater rapidity than before.

The conditions here enumerated are analogous to those first induced in 1851 by Prof. Cl. Bernard when he divided the cervical sympathetic nerve. In those parts of the head to which that nerve is distributed the flow of blood was increased. The effects of this increase, as noted by several different observers, are very numerous, remarkable, and instructive.* Assuming the vaso-motor function of the Sympathetic to have been already known, those effects are what might have been stated *à priori;* and various as they are, they may be all summed up in the words of Dr. Brown-Séquard —"dilatation of bloodvessels, afflux of blood, increase of vital properties." These phenomena, which Prof. Cl. Bernard induced in the head of an animal by section of the cervical Sympathetic, I have induced in the head, thorax, abdomen, pelvis, and four extremities of man by the application of ice to different parts of the back.

If "dilatation of bloodvessels, afflux of blood, increase of vital properties," may be thus induced, it follows inevitably as will be presently shown, that "both the force and frequency of the heart's action" may be proportionably increased also. The opposite statement—viz., that the application of ice to the spine lowers the pulse and vital force—is therefore, *as a general doctrine,* erroneous, and, though liable to exceptions which I shall afterwards mention and explain, need no longer deter physicians from exercising the great remedial power at their command in the shape of ice when judiciously applied to a part or to the whole of the back, or from making experiments to ascertain what the extent of that power is.

Ice is a direct sedative to the spinal cord, if applied immediately over it: by lessening the amount of blood in it, ice lessens directly its functional power.

Ice applied over and on each side of the spine is also a direct sedative of those organic nervous centres which preside over the vascular system; but though *directly* lessening the amount of blood in them, and consequently their controlling force over the bloodvessels they govern, ice may be *indirectly* an immensely powerful stimulant of the circulation and of the vital processes,

* Dr. Brown-Séquard has published a list of the "Phenomena observed in the head, on the side of the operation," and of the "Authors who have made the first observation." See his "Lectures on the Physiology and Pathology of the Central Nervous System," p. 140.

and may thus influence all parts of the body except the spinal cord and the sympathetic ganglia themselves.*

Having proved by repeated experiments that cold applied to the back is capable of producing the effects above stated, I next proceeded to realize my idea of the effects of heat applied in the same way. My first experience of this kind was in the treatment of a case of menorrhagia. The result was decisive, and has since been confirmed by an extensive experience in reference to various parts of the body. Of course, the physiological conditions induced by heat applied to the back are precisely opposite to those already enumerated as induced by cold:—1st. The temperature of the sympathetic ganglia being raised, the flow of blood to them becomes more copious, and consequently their functions become more energetic than before. 2nd. Their nervous influence passes in fuller and more powerful streams along the nerves emerging from them, and ramifying over the bloodvessels which they control. 3rd. The muscular bands surrounding those vessels are stimulated by this increased nervous afflux to contract with more than their usual force, and so to diminish proportionably the diameter of the vessels themselves. 4th. The diameter of the vessels being thus lessened, the blood flows through them in less volume and with less rapidity than before: indeed, it is probable that, while the nervous ganglia in question are made to emit their maximum of energy, many of the terminal branches of the bloodvessels acted upon become completely closed.

This series of effects caused by heat applied to the back is identical with that induced in the head by galvanizing the cervical Sympathetic. In 1852-3, after Prof. Cl. Bernard had demonstrated the effects which invariably follow the section of that nerve, Dr. Brown-Séquard, Prof. Cl. Bernard, and Dr. Augustus Waller found, independently of each other, that its galvanization

* As it is probable that the bloodvessels of the spinal cord, in common with those of the rest of the body, are subject to vaso-motor nerves emerging from the Sympathetic, it is reasonable to suppose that the circulation in the cord is subject to two contrary influences when cold or heat is applied along the back. When cold is applied, the one influence is direct and sedative, the other indirect and stimulant; when heat is applied, the one is direct and stimulant, the other indirect and sedative. The direct influence is, however, indubitably far more powerful than the indirect one. It is conceivable, according to the hypothesis here stated, that cold or heat may be applied on each side of the spine at such a distance from it as to ensure that the indirect influence on the bloodvessels of the spinal cord, through the agency of the Sympathetic, shall be greater than the direct influence; but much careful investigation will be needed to determine this possibility.

is invariably followed by effects exactly opposite to those of its section. These effects, so far as observed, are enumerated by Dr. Brown-Séquard, who sums them up under the three heads—"contraction of bloodvessels, diminution of blood, decrease of vital properties." These effects, induced in the head of an animal by galvanizing the severed end of the upper part of the cervical Sympathetic, I have induced in the head, chest, abdomen, pelvis, and extremities of man by heat applied to the back.

In fact experience enables me to say, with certain reservations, stated at pages 21-22, that by the proper application of cold along the whole spine, the *general circulation*, and therefore the action of the heart, may be accelerated; and by a like application of heat, the general circulation, and therefore the action of the heart, may be retarded. If, however, as I have stated elsewhere, before the ice is used, the pulse is abnormally high, owing to nervous excitement, or irritation caused by disease, it will fall to nearly its normal standard after ice has been used for a short time; having so far descended, it will generally be sustained there as long as ice is used, provided the patient be well fed. But, *if, owing to excessive action of the sympathetic nervous centres,* the frequency of the heart's action be below the normal standard of any given patient before ice is applied, it will, generally speaking, steadily increase under the use of ice until it exceeds that standard, and, if the patient be well fed, and his general health carefully attended to, the increase will be maintained throughout the period of treatment.

If we confine ourselves to the doctrine of Harvey as an adequate explanation of the circulation of the blood, we shall indeed find it exceedingly difficult, if not impossible, to understand how cold along the spine can increase, and how heat along the spine can decrease the general circulation. The conviction, however, has been deepening of late years that a variety of phenomena observable even in man and the higher animals—phenomena in the production of which the movement of the blood is chiefly concerned—are not accounted for by the hypothesis of Harvey; and, in proportion as we descend the animal scale, this hypothesis becomes more and more inadequate as an explanation of the movement of the blood. Blushing, sudden paleness of the face, flushings and chillness of the whole body, frequently occur without any corresponding disturbance or modification of the heart's action. The enlargement of the mammæ, the turgidity of the nipples during suckling, the sudden suffusions of the reproductive organs, menstruation, the

supersanguineous condition of the gums during dentition, the steady movement of the blood in the capillaries, the circulation through the liver without the intervention of any propulsive force, the circulation in monsters born without a heart, the fact that after death the arteries are usually found empty, and, pre-eminently, the local afflux of blood in inflammation, cannot be accounted for on the hypothesis that the heart is the sole mover of the blood. Attention having once been fully directed to these and many other facts of like significance observable in man and the mammalia generally, physiologists have not been slow to discover a whole series of facts in different departments of the animal and vegetable kingdoms which, while tending to discredit the generally received doctrine concerning the circulation of the blood, greatly contribute to elucidate, if not fully to explain, the phenomena above mentioned and others of a similar nature which the heart is obviously incapable of producing. In many vegetable cells movement of the contained fluid, seemingly of an automatic character, occurs; the circulation of the sap in plants takes place without the intervention of any central force or propulsive organ; in the lowest forms of the protozoa, in which no contractile vesicle is discernible, a rapid movement of granules is nevertheless distinctly visible; and, overleaping the intervening grades of animals in which the circulation is more or less exclusively carried on without the aid of a heart, we see in fishes a very remarkable example of the extent to which the blood circulates independently of any propulsive force. The single heart of these creatures is employed only in pumping the blood to the gills; having passed through them, it circulates through the entire system and returns to the heart, no pressure from behind being exerted upon it. In presence of these facts the question arises—What is the force which moves the fluid in the several instances adduced?

Stated in its simplest form, the answer is that the force in question is a chemical one, and consists in the attraction between the cell or tissue requiring to be nourished or transformed and the elements provided to minister to this change. In the case of the higher organisms possessing a heart its function is purely ministerial: it serves, in fishes, to propel the blood to the gills only; in mammals it not only propels it to the analogue of the gills—namely, the lungs—but also to the entrance of the systemic capillaries. In 1836 Professor Alison of Edinburgh published his reasons for believing that a great auxiliary force is exerted in the capillary vessels: this doctrine has been developed

and illustrated by Dr. Draper of New York, in his admirable work on Physiology, and is adopted by Dr. Carpenter. The mode of attraction by which the "auxiliary force is exerted in the capillary vessels" is thus stated by Dr. Draper, who, speaking of the blood in the systemic capillaries, says:—"The oxidizing arterial blood has a high affinity for those portions [of tissue] that have become wasted: it effects their disintegration, and then its affinity is lost. The various tissues require repair; they have an affinity for one or other of the constituents of the blood; they take the material they need and their affinity is satisfied; or secreting cells originate a drain upon the blood, and the moment they have removed from it the substance to be secreted, they have no longer any relation with it. So processes of oxidation, and processes of nutrition, and processes of secretion, all conspire to draw the current onward from the arteries, and to push it out towards the veins; and though these processes may present themselves in many various aspects, they are all modifications of the same simple physical principle." In the pulmonary capillaries the same physical principle comes again into action. "The venous blood has a high affinity for the oxygen of the air, an affinity which is satisfied as soon as the blood presents itself in the cells of the lungs. Arterialization being accomplished, the portions to be exchanged exert a pressure on those that have changed, and the blood, moving forward in the pulmonary veins, reaches the left auricle of the heart."

This doctrine of the nature of the forces effecting the circulation of the blood enables us to explain how ice, applied to the back, increases the force and frequency of the heart's action. The terminal branches of the arteries having been allowed to dilate in the manner already explained, an increased quantity of blood is brought in contact with the tissues, between which and itself a chemical attraction exists. The amount of attractive force exerted thus becomes larger than before, and therefore the amount of chemical change also. The whole of the transformative processes are proportionately intensified, and the vitality of the part in like manner heightened. Increased rapidity of textural transformation involves increased demands on the nutritious and vitalizing elements of the blood, which is consequently drawn to the part in still more copious streams, and which passes through its capillaries more swiftly than before; while the greater heat evolved reacts as a stimulant and favouring condition of still more rapid chemical change, and be-

comes diffused to a certain extent through the blood of the whole body. The heart, sharing in the general stimulation, becomes more active, and, responding to the heightened attraction of the textural elements for blood, sends it to them with increased rapidity, fresh supplies being forced upon it with equal speed by the pulmonary capillaries, which are called upon to do their decarbonizing and oxygenating work more quickly than before.

Heat acting on the vaso-motor nerve-centres produces physiological effects directly upon them and indirectly on the blood-vessels which they govern of a character exactly opposite to that of those just described. The nerve-centres, acquiring a maximum supply of blood, compel the relaxed bloodvessels related to them to contract, and thus, shutting off a large proportion of the blood which would otherwise have flowed through them, lessen the rapidity of the vital processes in the structures amid which they ramify. This diminution of textural transformation, of nutrition and decay, is accompanied by a corresponding diminution in the amount of heat evolved, and in the functional activity of the structures in question. The sedative influence which has thus been exerted locally becomes diffused generally throughout the system, often to an appreciable extent, the blood passing through the part acted on being less than before; and in consequence of the fall in the local temperature, the chemical changes to which even this lessened quantity ministers being also lessened in intensity, the temperature of the whole blood becomes proportionately lowered, and therefore proportionately less stimulant in all parts of the body. Moreover, the local vitality or textural change, and, therefore, the attraction between the structures acted on and the nutritious and vitalizing elements of the blood being lessened, the blood is moved through the capillaries more slowly, and is drawn to them less abundantly and less swiftly, than before; while the demands on the heart being to a like extent lowered, and the pulmonary capillaries forcing upon it less supplies of newly oxygenated blood than before, it acts with proportionately less energy and rapidity. In this assemblage of phenomena is presented an *exact likeness* of what occurs in a large number of women when uterine or ovarian irritation is propagated to, and reflected from, those nervous centres which preside over the blood-vessels of the lower extremities. The vessels contract, the limbs become cold, their vitality is lowered, the blood returns from them colder than from any other part of the body, and diffusing its sedative or deadening influence throughout the entire blood,

lowers the whole constitutional energy, together with the force and frequency of the heart's action.

But now arises the question, what is the source of the chemical force here alleged to effect the movement of the blood, and how does it operate? The physiologists just named have not attempted to answer this question; indeed it does not seem to have occurred to them to propound it. My answer to the question is that the source of the force is the spinal cord, and that the force operates through spinal nerves distributed to every tissue in the body, and presiding over those transformative processes which constitute its life. This statement will, I hope, be rendered intelligible, and will be justified by the immediately following paragraphs,* which, while explaining the neuro-physiology of secretion, will, at the same time facilitate the apprehension of the doctrine here affirmed concerning the function of the spinal cord as the real cause of textural irritation and the circulation of the blood.

"Second only in importance to the power here described of increasing or decreasing the general circulation, through the agency of the nervous centres, is the power, I have also discovered, by which the glandular system—especially of the skin and of the mucous membranes—may be influenced in like manner, but with this very remarkable difference, viz., that whereas the peripheral circulation is increased by cold and decreased by heat along the spine, the activity of the glandular system is decreased by cold and increased by heat along the spine. These results involve a seemingly astonishing paradox; for, when heat is applied along the spine, and when, consequently, as I allege, the glands are stimulated most vigorously, the vaso-motor nerve-centres are emitting their maximum of energy, and are thus shutting off a large proportion of the blood which otherwise would be passing through the peripheral arteries. Hence it seems, at first sight, as if glands secrete most copiously at the very time when blood —the source of their products—is flowing to them least copiously. The following facts which I have ascertained will illustrate this statement:—

"If in a case of feverishness, the skin being hot and dry, heat be applied along the spine, the skin will become moist and comparatively cool *simultaneously*. If, during the first stage of bronchitis, when there is an irritative cough, when the bronchial mucous membrane is void of mucus and is dry, and when there

* Quoted from the Introduction to my work on *Diarrhœa and Cholera.*

is dyspnœa with pain and a sense of fulness in the chest, a double column of heat be applied between the scapulæ, the irritative cough will subside, bland mucus will be secreted, the painful sense of fulness and difficulty of breathing will be relieved, and the thoracic integuments, previously warmer, will become cooler than normal. Again, if heat be applied along the lower half of the dorsal spines, the usual restraining influence on the peripheral circulation will be exerted; and meanwhile, in many cases, nausea, and in some cases vomiting even, will be induced. And again, if heat be applied along both the lower dorsal and the lumbar spines, the bowels will be deprived of their wonted supply of blood, and, in some cases, the amount of mucus poured out from the intestinal mucous membrane will be so copious as to induce diarrhœa.

"And contrariwise: if in a case of so-called general relaxation, associated with a cold, unduly moist (clammy) skin, ice be applied along the whole spine, the system will experience a tonic influence, and simultaneously the skin will, as a general rule, become both warmer and drier. If, during the latter stages of bronchitis, when all inflammatory symptoms have subsided and mucus is exuded and coughed up in great abundance, ice be applied between the scapulæ, the temperature of the thorax will be raised and the secretion of mucus will be lessened or arrested. Analogous results may be obtained by the same means in each segment of the body. During severe sea-sickness the skin is cold and is covered with perspiration, mucus is vomited from the stomach after whatever food it may have contained has been ejected, diarrhœa often occurs, and each of these morbid states is subdued by the use of the spinal ice-bag.

"Now the condition described in the first of the two preceding paragraphs as induced by heat, and in the second as restrained or subdued by cold, is two-fold: in the first case, it consists in a contraction or collapse of blood-vessels, and simultaneously in an excessive outpouring from the glandular organs—especially from those of the mucous membranes and of the skin; in the second case, it consists in a dilatation of bloodvessels, and in a diminution of the activity of the glandular organs—especially of those of the mucous membranes and of the skin.

"It cannot be said that one of these conditions being induced the other necessarily occurs, for they may be induced separately: when the surface of the body is exposed to a high temperature, profuse sweating occurs, but a maximum amount of blood circu-

lates in the skin, the bloodvessels of which therefore are dilated. On the other hand, when the surface of the body is exposed to a low temperature, the bloodvessels of the skin are contracted, and a minimum amount of blood is circulating in them, but no perceptible sweat whatever is exuded. If, however, instead of modifying the temperature of the *surface* of the body, the nervous centres along the spine be acted upon, both the conditions in question are then induced, and are inseparable; cutaneous anæmia, and cool, or cold sweat occur together; and in like manner anæmia of the inner skin—the mucous membrane—and a copious exudation of mucus simultaneously take place. While, therefore, it is clear that cutaneous anæmia and perspiration on the one hand, and anæmia of the mucous membranes and free exudation of mucus on the other, do not respectively stand in a causal relation to each other, it is not less clear that each is a result of one common cause, viz., hyperæmia of the nervous centres along the spine.

"The paradox here advanced, that the skin and mucous membrane exude their appropriate secretions copiously at the very time when they are receiving blood—the source of those secretions—least copiously, is itself extremely surprising, and, at first sight, difficult to understand: but the surprise and difficulty are greatly increased of those who hold the commonly received doctrine that the secreting processes are mainly under the direction and control of the sympathetic; for that doctrine implies that the influence thus exerted upon the various glands consists chiefly, at all events, in regulating their blood-supply, and that, therefore, their activity and products are increased by permitting their arteries to dilate, and are lessened by causing them to contract. Whereas it appears that while the contractile energy transmitted to the gland-arteries from the sympathetic ganglia is at its maximum, the glands are active, and pour out their products freely.

"The question, How does the mucous membrane secrete mucus and the skin sweat abundantly while supplied with a minimum amount of blood? is as interesting and important as it seems at first sight difficult to answer. I shall, however, propose a hypothesis by way of provisional explanation of the phenomena—a hypothesis which, in the present state of our knowledge, is undoubtedly liable to be confuted, but which, inasmuch as it accounts for the facts in question, will, perhaps, be held worthy of acceptance until disproved, and will meantime indicate the direction and shape the course of further inquiry. The above-

mentioned facts, and others to which I shall briefly refer, lead me to the conclusion that *all* secreting organs are supplied with nerves acting directly upon their constituent cells, which become active or passive according to the amount of nervous influence distributed to them; that their elective affinity for the particular elements of the blood which they separate from it, and the force of their attraction for blood on which to operate, are exclusively due to and dependent on that influence; that when that influence is exerted in a maximum degree, the attractive force exerted by the gland-cells on the blood is so great that it counteracts and neutralizes the contractile force of the muscular coat of the arteries from which they derive the blood they require, and therefore, that while hyperæmia of the nervous centres lessens the general blood-supply to the periphery of the body, by causing contraction or tonic spasm of the peripheral arteries, that same hyperæmia generates and transmits to the gland-cells a preternaturally strong nervous influence, enabling them to draw copious currents of blood to themselves through their special arteries, notwithstanding that they are at the same time subject to the maximum of contractile force, and that the peripheral arteries generally are in a condition of anæmic spasm.

"In my pamphlet on Sea-sickness, published in 1864, I said, 'It may be that the sweat-glands are under the control of a special set of nerves as distinct in their functions as those presiding over the circulatory system. Their action, however, may be very different. The stimulus of a vaso-motor nerve, as we know, causes the vessel on which it ramifies to contract; but the stimulus transmitted along the nerves presumed to regulate the action of the sweat-glands may cause them to pour out their secretion in increased abundance. If so, it is intelligible how it comes to pass that when there is a maximum quantity of blood in the sympathetic nervous centres, induced in cases of sea-sickness, as already explained, perspiration is profuse, although there is a minimum amount of blood in the skin. I am tempted to make this suggestion, because when in treating cases of an inflammatory character, the pulse being high, and the skin hot and dry, I have applied heat along the back, not only has the pulse been reduced, the inflammatory symptoms subdued, and the skin become cool, as I predicted and expected, but, unexpectedly, the patients have also speedily broken out into perspiration. In these cases it is certain that the nervous centres along the back had an unusual amount of blood drawn into them by the heat which had been

applied, and that, therefore, they were, physiologically speaking, in the same state as are the nervous centres of persons suffering from sea-sickness, and in both classes perspiration obtains. I have already adverted to the great sympathy or intimate relation between the skin and the mucous membrane of the alimentary canal, indeed there is great analogy between their functions; and bearing on this question of the physiology of sweating, I have observed a fact in respect to the bronchial mucous membrane similar to that which I have just recorded in reference to the skin, and of an equally unexpected character. In treating pulmonary catarrh and bronchitis, I apply heat along the dorsal region, in order, by inducing a preternatural afflux of blood in the thoracic ganglia, to cause the arteries supplying the bronchial mucous membrane to contract. Now, if at the stage of congestion of this membrane, when it is dry, its wonted secretion being absent, heat be applied to the dorsal region, as described, not only will the congestion be lessened, as I expected, but, contrary to what I at first expected, a secretion of mucus rapidly ensues, to the great relief of the patient. It seems to me that this phenomenon can only be accounted for on some such principle as that suggested to account for the perspiration also induced as described by the application of heat to the back. These suggestions receive considerable countenance from the fact announced by Prof. Claude Bernard—that the salivary glands are not under the control of the sympathetic, but of the lingual nerve, and that their secretion increases in proportion to the amount of positive stimulus received by them from that nerve. It seems to me probable that what I have just said will explain how the sweating, sickness, and diarrhœa of phthisis are induced, and will suggest how it may be lessened or prevented. The sympathetic ganglia are, I believe, brought into a state of hyperæmia by the irritation of the vasic nerves distributed to those bloodvessels in the vicinity of tubercular deposits; and this hyperæmia becomes the proximate cause of the phenomena in question.'

"When I wrote the foregoing paragraph, the only knowledge I had of Bernard's discovery respecting the salivary glands was derived from the following statement by Brown-Séquard:—'The researches of Czermak and of Professor Bernard tend to show that the increase in the salivary secretion does not depend on the sympathetic nerve, but on the lingual.' I have since had the good fortune to become personally acquainted with Professor Bernard, who kindly presented to me copies of several monographs

in which his discoveries were communicated to the Academy of Sciences, and from these I have obtained the most satisfactory confirmation of the views I have expressed respecting the innervation of the glands of the mucous membranes and of the skin.

"Bernard has proved that the submaxillary and parotid glands are each supplied with a special motor nerve, emanating from the cerebro-spinal system, as well as with the branches of the sympathetic supplied to the arteries of the glands. He has also proved that when the cerebro-spinal nerve is excited, the gland becomes active, that the amount of blood which then passes through the gland is greatly increased, that the colour of the blood flowing through the glandular vein becomes red, and that the amount of saliva secreted is proportionate to the irritation of the cerebro-spinal nerve; also, that if the branches of the sympathetic nerve distributed to the gland be irritated, the supply of blood to it is almost wholly cut off, that the salivary secretion is arrested, and finally, that when the same branches are divided the supply of blood to the gland and the secretion of saliva become copious. The special motor nerve of the submaxillary gland is the chorda tympani; that of the parotid gland consists of a branch or branches from the auriculo-temporal nerve.* For the sake of convenience, I shall henceforth call the special motor-nerve of each gland *the positive motor-nerve*, and the branch of the sympathetic distributed to the glandular artery, *the negative motor*.

"Bernard himself infers from the facts just mentioned, that a like structural and physiological arrangement obtains in relation to glands generally, and has proved that when the kidneys are active, red blood flows from the renal vein. Thus my own discoveries with respect to the action of cold and heat along the spine on the secretion of sweat and mucus, harmonize with his respecting the innervation of the salivary and parotid glands; while my inference that special cerebro-spinal (positive motor) nerves preside over the functions of the mucous and sweat glands, receives the highest authoritative and scientific sanction, inasmuch as Bernard's discoveries, respecting the salivary glands, led him to a conclusion similar to mine concerning the general functional relation of the nervous to the glandular system."

In the Introduction from which these passages are quoted, I gave a summary of the present state of knowledge con-

* Ludwig has also instituted experimental researches into the innervation of these glands: his results are in general accord with those of Bernard.

cerning the relation of the nervous to the glandular system, and then observed,—"This summary will be admitted, I presume, to present convincing evidence that the disposition of the nervous system is such as to enable every gland in the body, whether cutaneous, or mucous, or special, to derive a positive motor nerve from some part of the cerebro-spinal axis; for it shows that two glands have been proved to possess cerebral nerves acting as motors: that the lachrymal derives a motor filament from the fourth or third nerve, or from both; that the sublingual derives branches from the ninth; that the mammæ are innervated direct from the spinal cord; and that, in every case in which glands are not yet proved by anatomical evidence to possess positive motor nerves from the cerebro-spinal system, physiological, pathological, and often therapeutical facts, prove that they must be so innervated, while anatomy offers no evidence whatever to the contrary. The therapeutical consequences of the establishment of this large anatomical and physiological generalization are unspeakably great, and cannot even be foreseen at once in all their magnitude. Each physician can, however, think out for himself the extent of the therapeutically revolutionary doctrine involved in the statement, that diseases of the skin and of each mucous membrane, to the extent at least to which their glands and their blood-supply are concerned, are, according to the evidence already tendered, nervous diseases, and that the most scientific method of treating them is through the agency of the nervous system.

"But it seems to me that the present state of anatomical and physiological science justifies the extension of this generalization still further by enabling us to prove analogically, and also by means of some important facts directly relating to certain structures in question, that the constituent elements of the tissues forming every organ of the body are as completely under the control of the nervous system as is each individual cell of the cutaneous, mucous, or special glands. The limits within which I desire to confine this introduction preclude me from entering at length on this subject here; and I content myself now with stating my conviction that, in the same way as gland-cells are shown to become attractive to the blood supplied to them by virtue of nervous influence exerted directly upon them, so the cells forming all other structures of the organism are endowed with their peculiar elective affinities for those elements of the blood needed for their nutrition and especial purposes by the agency of centrifugal, or

positive motor nerves operating directly on the cellular elements of each structure.

"Assuming this proposition fairly proveable, we should be able to say of the bodily structures generally that, in addition to the sensory nerve supplied to each, there are two motors: one exercising on the cellular constituents of the structure a stimulant influence, causing it to attract blood to itself; the other by stimulating the muscular coat of the arteries, causing them to contract, and thus to regulate, restrain, or even arrest the blood-supply. If this doctrine be at once true and applicable to the whole body, it appears that healthy life, like the perfect movements of the planets, consists in a balance or relative adjustment of two opposing forces; and that while considerable perturbations of those forces are not inconsistent with health, any excessive subordination of the one to the other induces, or, indeed, constitutes disease, in the structure in which it occurs. Inflammation ending in textural death by excessive and therefore exhausting activity of the reproductive force is induced when the positive motor nerves have become exclusively active; anæmia, also ending in death by mere cessation of the vital processes, is induced when the negative motor nerves are exclusively active. There are few constitutions, I apprehend, in which the relative strength of the positive and negative motor nerves, or, to go further back, the cerebro-spinal and the sympathetic nervous systems, is adjusted to a perfect standard. The greater or less relative strength of each in the organism is, I believe, the ultimate physical fact lying at the foundation and determining the character of national and individual temperament. The differences in different individuals in this respect account, in my opinion, for the widely different effects which are produced in them by the application of cold or heat along the spine."

I have said that cold applied along the spine will produce effects on the peripheral circulation like to those produced by division of the sympathetic; and that heat so applied will produce effects like to those produced in any given region—the head for example—by galvanizing the part of the sympathetic distributed to that region. And this is strictly true; but while those effects which are produced by cold and heat applied to the spine, are respectively identical in nature with those produced by section and galvanization of the sympathetic, they are less in degree, and in some cases though existing may be completely masked by an agency which is not operative in cases in which the sympathetic,

by section or galvanism, is alone operated on. When ice is employed it exerts a directly sedative influence on the spinal cord, and thus by lessening the amount of blood in it lessens its functional power. Now, as stated above, there are good reasons for believing that the constituent elements of the tissues forming every organ of the body are animated by nervous influence originating in the spinal cord, and endowing them "with their peculiar elective affinities for those elements of the blood needed for their nutrition and especial purposes." If so, ice along the spine, while conducive to peripheral hyperæmia by relaxing the terminal branches of the arteries through depressing the energy of the sympathetic, lessens at the same time the intensity of that attractive force proceeding from the spinal cord, by which the various structures of the organism draw blood to themselves and select from it the elements which they assimilate and transmute into the peculiar forms and products which it is their several function to elaborate. And conversely heat along the spine, while conducive to peripheral anæmia by constringing the terminal branches of the arteries through increasing the energy of the sympathetic, increases at the same time the intensity of that attractive force by which the tissues, as just explained, suffuse themselves with arterial blood.

Now it is obvious that if the two forces in question were equally great, and were always acting with equal intensity, the application along the spine of cold or heat, supposing either the one or the other to be capable of affecting the spinal cord and the ganglia of the sympathetic equally, would in no way disturb the relation of equality subsisting between them; cold would depress each equally, and heat would exalt each equally. If, on the other hand, the forces in question are aboriginally unequal, a sedative or a stimulus acting *directly* with equal power on each of them, will *indirectly* produce unequal results at the periphery where the terminal branches of the two sets of nerves—spinal and sympathetic—are distributed. And this, in fact, is the case: in so far as the nutritive processes and the circulation of the blood are concerned, organic disturbances, whether of mental or physical origin, make themselves felt much more obviously and decisively through the medium of the vaso-motor nerves of the sympathetic than through those spinal nerves which act as the causative agents of textural nutrition. Violent mental shock or sudden and severe bodily pain acting as a shock to the system, produces its characteristic phenomena chiefly through its influence on the sympa-

thetic centres, which are so vehemently excited that by their excessive energy they cause a general contraction of the arteries throughout the body, and hence the deadly pallor and coldness of the surface, the torpor of the brain, and the lessened activity of all the vital processes. The phenomena of ordinary fainting-fits are mainly referrible in like manner to excessive action of the sympathetic; so also is shivering, when not produced by external cold. Disorders of the pelvic viscera—especially of the reproductive organs—originate reflex actions along the vaso-motor tracts in various directions: one consequence is chronic contraction or spasm of the arteries of the lower extremities, resulting in that common malady with which women are more especially familiar—habitual coldness of the feet. The part played by the cerebro-spinal system as a proximate cause of these different disorders of the circulation is by no means obvious; indeed, whatever it may be, it is so subordinate to that of the sympathetic that physiologists as well as physicians ignore the functions of the cerebro-spinal axis when describing the forces by which the circulation of the blood is effected. No doubt the generally accepted, but erroneous doctrine, that the sympathetic is the efficient cause of glandular action or the processes of secretion, has tended to confirm the belief that the spinal cord has nothing to do with what are technically called the "organic processes"; for were the rôle of the cord in respect to secretion clearly understood, the nature and extent of its agency in effecting the circulation of the blood would be more likely to become recognised and appreciated. It must be admitted, however, that, even were it duly recognised, the morbid phenomena just mentioned must still be ascribed mainly to the action of the sympathetic when in a state of either tumultuous or chronically excessive activity.

From what has now been said it will be perceived that the extent of the difference in amount between the spinal and the sympathetic nervous forces which effect and regulate the peripheral circulation—both systemic and pulmonary—constitutes the sphere within which cold or heat, applied along the spine, operates to modify that circulation, and *in respect to it* may, perhaps, be held to be approximatively the measure of their influence. So that supposing, what I believe to be true in fact, that there are aboriginal differences in the relative strength of these two forces in different individuals, the effects of cold and heat applied along the spine will inevitably be different in different persons,

even though they are healthy. But while various degrees of difference of relation in which these forces are adjusted to each other are possible within the zones of health, and the action of heat and cold on the circulation within these zones is least obvious, so soon as there is any great preponderance of one force over the other, the latitudes of disease, in respect to the circulation, are entered on, and then the effects of cold or heat applied along the spine will become distinctly appreciable. As I stated in a paper read to the London Medical Society, March 18, 1867, —"In healthy persons, the arteries in all parts of the body being of normal diameter, the extent to which they may be dilated beyond their normal volume is comparatively small, and whatever increase or decrease of their diameters may be effected by modifying the temperature of the spinal region will, in many cases, be difficult of detection. If, on the other hand, arteries already much contracted be operated upon through the agency of the nervous system, the result will become strikingly apparent."

My experience on which this statement, made eighteen months ago, was based, was then very large, and since that time I have observed a crowd of facts confirming the doctrine in question. I could moreover cite evidence in support of it from the experience of several physicians who have now tested the efficacy of spine bags in the treatment of disease. Among the most interesting and precise observations of this kind are those made by Dr. D. B. Hewitt, at the City of Dublin Hospital, and published in the *Medical Press and Circular*, April 22, 1868. He states that in a case of delirium tremens, in which "coldness and paleness of the surface of the body were well marked at the time of the application of the ice-bag," among the resulting phenomena was "the production of a rise of temperature all over the body, with a return of the natural colour to the face." * * * In a man suffering from chronic bronchitis, the temperature, as taken in the axilla, was four-fifths of a degree higher after the ice-bag had been applied for one hour and forty minutes. * * * The following table represents the results of three observations made, in a case of hemiplegia, with one of Casella's maximum thermometers. The instrument in each case was placed in the axilla for ten minutes prior to the application of the ice, and again for ten minutes prior to its removal. The period of application of the ice was in each case an hour.

	Before Ice.	After Ice.	
1st Observation,	99·4	99·8	Rise of 2-5ths 1°
2nd Observation,	98·6	99·2	Rise of 3-5ths 1°
3rd Observation,	97·6	97·8	Rise of 1-5th 1°

These observations were most carefully made by Mr. Richard Croly, one of the Purser's students resident at the hospital.

"At a subsequent date, Mr. Finlay, the senior Purser's student, made another careful observation for me with the object of contrasting the effects on the sound and on the diseased side, and the result was extremely interesting. The temperature of the sound side was 98·4 both before and at the termination of the observation. While the temperature of the paralysed side rose from 97·8 to 98·2, thus indicating a rise of two-fifths of a degree."

In Dr. B. Lee's report of a case of sea-sickness (see Case XXIV.,) he says that when the "violent and distressing retching set in with scarce a moment's intermission, she rapidly became prostrate, the blood leaving the head and extremities, *which were very pallid and cold;*" and that within half an hour after the ice-bag had been applied her "hands and feet were of natural warmth, and her face had regained its wonted colour."

If, as I have already affirmed, the spinal cord is the efficient cause of textural assimilation and nutrition by maintaining the textural elements in a state chemically attractive of arterial blood, and if the sedative influence of ice could be exclusively exerted on the cord instead of extending as it usually does to the sympathetic centres, it is obvious that the chemico-vital processes, and consequently the evolution of heat would be lessened, the capillary circulation would be retarded, and the force and frequency of the heart's action would be lessened also. I have tried the experiment of applying a very narrow column of ice along the spine so as to limit its action as much as possible to the spinal cord, and have found, as I stated in one of my papers on *Cerebro-Spinal Fever* published in the *Medical Press and Circular* for July 17th, 1867, that in some cases at all events ice thus applied does actually exert a depressing effect on the circulation. It seems probable, therefore, that the reason why Dr. Todd believed that as a general rule ice applied along the spine exerts a powerful influence in what he called "depolarizing the spinal cord," and "diminishing the force and frequency of the heart's action," was because he applied the ice in ox gullets, which are narrow, and which in certain *adult* cases might have acted *chiefly* on the spinal cord in the way just suggested. Now if it

be possible thus to lessen the afflux of blood in a healthy spinal cord, it is readily conceivable that in the case of a patient whose spinal cord is already anæmic or in a state of partial atrophy or degeneration, the application of a spinal ice-bag wide enough to ensure the full sedative influence of the ice on the sympathetic ganglia as well as on the cord, would nevertheless *especially* depress the already feeble life in the latter, and in such a case of course the manifest action of the ice-bag would be to lower the circulation, the temperature, and the general vital energy of the patient. For, however much the sympathetic ganglia might have been acted on simultaneously, and however abundant therefore the supply of blood which, by permitting the peripheral arteries to dilate freely they admitted to the capillaries, such supply would avail nothing to nourish and invigorate the system so long as the cord remained powerless to animate the cellular constituents of the various organic tissues with that peculiar electro-chemical force which, as I allege, is the proximate cause of textural assimilation, the evolution of heat, and the movement of the blood through the capillary vessels. These remarks are also well illustrated by a case, reported by Dr. Hewitt, in which, after applying the spinal ice-bag, he observed a fall in temperature of three-fifths of a degree—denoted by one of Casella's instruments inserted in the rectum. The post-mortem examination revealed "white softening due to disease of the arteries, and consequent deficiency in the supply of blood."*

The following propositions† constitute a summary statement of the principles which I have now endeavoured to explain :—

1. That the chief function of the sympathetic nervous system consists in regulating the diameters of the bloodvessels throughout the body.

2. That when the sympathetic ganglia are in a state of maximum hyperæmia the nervous effluence from them to the muscular coats of the arteries to which they are severally related stimulates them so excessively as to induce in them a condition of tonic spasm—a spasm so intense as to result in shutting off the blood altogether from a large proportion of the peripheral arteries.

3. That when the sympathetic ganglia are in a state of maximum anæmia the nervous effluence from them to the muscular coats of the arteries to which they are severally related becomes

* *Med. Press and Circular*, 22nd April, 1868.

† Quoted, with corrections, from my work on *Diarrhœa and Cholera*, p. 14.

so extremely feeble that a condition resembling paralysis is induced; the muscular coats of the arteries become consequently extremely relaxed; and as the blood flows in the direction of least resistance, the parts supplied by the arteries in question become suffused with blood to an excessive degree.

4. That when the spinal cord is in a state of hyperæmia, cramps of the involuntary muscles surrounding the alimentary tube, cramps, or even convulsions of the voluntary muscles, an excess of glandular activity, and an excess of sensibility (hyperæsthesia), are likely to ensue.

5. That every gland and glandular follicle in the body is under the control of one motor nerve (which I call the *positive motor*) emerging from the cerebro-spinal system, and distributed to its secreting cells in order to regulate its functional activity; and of another motor nerve (which I call the *negative motor*) emerging from the sympathetic system, and distributed to its artery or arterial twig, in order to regulate its blood-supply.

6. That in the same manner as glands are supplied with positive, as well as with negative motor nerves, so, there is reason to believe, every tissue of the body is thus supplied, and is thus placed and sustained in a state of elective affinity for the elements of the blood requisite for its nourishment and functions.

7. That the sympathetic ganglia and the spinal cord can be rendered hyperæmic or anæmic, artificially, by means of heat, in the one case, and cold in the other, applied along the spine.

8. That cold applied along the spine will subdue cramps, or excessive tension, of both voluntary and involuntary muscles, will lessen sensibility, will lessen secretion, and will increase the general circulation and bodily heat.

9. That heat applied along the spine will (in some cases) induce cramps of both voluntary and involuntary muscles, will increase sensibility, will increase secretion, and will lessen the general circulation and bodily heat.

I will now advert, seriatim, to each of the phenomena mentioned in propositions 8 and 9, in order to show how far the requirements of the theory in question are complied with by facts reported not only by myself but by other professional observers.

1. *Muscular tension is diminished by the application of ice along the spine.*—I have proved this, and have published the proofs in respect to each of the several forms of morbid muscular contraction. A very interesting, instructive, and complicated case in

which cramp of the lower extremities, as well as excessive coldness of the surface of the body (spasmodic contraction of peripheral arteries), had long been a most distressing feature, and which was completely cured by the spinal ice-bag, is given as 'Case XIII.,' at page 26, of my book, on the *Functional Diseases of Women*. This is the only form of cramp in respect to which, so far as I am aware, no medical man has yet adopted my method of cure by means of ice. The power of the spinal ice-bag to arrest the cramps of diarrhœa and cholera I have exemplified in several cases, which are reported in detail in my book on those diseases. That this excruciating muscular disorder, for the cure of which drugs are confessedly powerless, can be subdued by ice applied to the spine was verified by Mr. D. M. Williams, surgeon, of Liverpool, in a case which he kindly sent me, and which is published as 'Case V.,' at p. 42 of the work just mentioned. Referring to the effects of the ice-bags in cases of cholera, Dr. Lake, 'Surgeon to the Royal South Hants Infirmary,' &c. &c., said:—"It proved itself a remedy of very considerable power, restoring the heat, *relieving the cramps*, checking the vomiting and purging. Its use was followed by reaction from collapse, even in cases where the patient was quite pulseless." And Mr. Henry Bencraft, 'Medical Officer to the Southampton Workhouse,' observed: "Its power to relieve the vomiting, purging, and *cramps*, is almost marvellous; and its influence over the circulation, in restoring heat to the surface of the body, and bringing back the pulse when nearly, and in some cases entirely gone, must be seen in order to be properly appreciated." Dr. Griffin, of Southampton, who also speaks from experience of the value of the ice-bag in the treatment of cholera, stated to me, in 1866, and repeated the substance of his statement in the *Lancet*, in 1867: "*It stops the cramps*, vomiting, and purging; it makes the patient warm, and it prolongs life." Professor Parkes, who was appointed by the Government as Medical Inspector during the outbreak of cholera at Southampton, and who, though of opinion "that the trial must be greatly extended before any decided opinion can be given," reported that "*the bags appear to lessen the cramps.*"* Case V., described in Section VI. of the present work, and which was under my own care, exemplifies the presence of powerful tonic spasms or muscular rigidity, as an accompaniment of sea-sickness, and the complete

* The Letters and Report from which these passages are extracted are given *in extenso* in my work on *Diarrhœa and Cholera*. See Chapter VI.

subjugation of this symptom by the ice-bag. Case XXIV., described by Dr. B. Lee, proves "that severe spasmodic contractions of the muscles of the extremities, with intense pain in the lower part of the abdomen" may be subdued "in three minutes" by the same agent. Its efficacy in the treatment of convulsive affections, including laryngismus stridulus, chorea, infantile convulsions, and epilepsy, I have proved most conclusively, in a paper which, in March, 1867, I read to the Medical Society of London. I gave numerous cases in which, by the treatment in question epileptic fits have been completely arrested—the general health of the patients being improved meanwhile, and I have published cases of laryngismus stridulus, and infantile convulsions rapidly cured, after drugs had been tried in vain. Happily, my successful experience in the treatment of convulsive affections has been already confirmed by several other physicians—viz., Dr. Routh, Dr. Rogers, Dr. Edmunds, Dr. Wilkinson, Dr. Griffiths, and Mr. Ernest Hart of London; Dr. J. Waring-Curran, of Bexhill; Dr. Barber, of Ulverstone; Dr. J. H. Benson, of Dublin, and Dr. de Faye, of Brussels. I have published evidence that prolonged muscular rigidity, whether due to acute or chronic disorder of the nervous centres, may also be treated successfully by means of ice: a case of the former kind which I called, "Tetanoid Paralysis of the four extremities," and which I treated successfully, the patient being completely restored, was communicated to the Harveian Society, and published in the *Medical Press and Circular*, in May, 1867. Dr. Edmunds has published* the case of a woman with a nearly similar and equally dangerous malady, which was cured by ice to the spine, after medicine had proved useless. Dr. Roberts, of Northallerton, Yorkshire, who consulted me about a case of traumatic tetanus, which had "remained almost stationary for a fortnight," and who had "given the patient belladonna and morphia to no purpose," applied ice, by means of two bags at once in the way I suggested, and, as he informed me, effected a cure. Dr. Wm. Ogle, of St. George's Hospital, published, in 1866, a case of "tetanoid convulsions, overcome for a time by application of ice to the spine," and appended the following comment:—"The substantial relief from the ice application was not a little interesting, and speculation upon the probability of a greater and more permanent benefit from a longer application of the ice could not be resisted."† Mr. Hargrave, surgeon,

* In the *Medical Times and Gazette*, March 12th, 1864.

† *Medical Times and Gazette*, June 16th, 1866.

of Dublin, has also published* a case of tetanus in which the like substantial relief was given by the application of ice in an ox-gullet, and in which had a properly-constructed spinal ice-bag been used a cure would probably have been effected. Unfortunately the gullet which was used burst in the night, and, therefore, ice was not afterwards applied. The muscles of the lower jaw had already become so relaxed that the patient could open her mouth and take nourishment. The *Australian Medical Journal* for March, 1866, contains a report of a case of tetanus treated successfully by the application of ice along the spine. The *British Journal of Homœopathy*, for April, 1866, mentions two cases treated successfully by the same method. In Professor Morgan's case of "cerebro-spinal inflammation" already mentioned, the rigidity of the muscles of the trunk and extremities, also yielded to the influence of the spinal ice-bag.† In the appendix to my pamphlet on "The Functional Diseases of Women," I published a case of chronic hemiplegia, in which the paralysed arm was rigid, and could not be raised above the shoulder. The wrist and hand were not only powerfully drawn to the ulnar side, but so firmly flexed upon the forearm as to resist whatever extending force the patient (a boy aged 13) could apply with his right hand. The thumb was fixed in the palm of the hand, the fingers being bent over it. The paralysis and rigidity had continued from infancy. After two months of treatment this boy could raise his arm much higher than before; he could open his fingers completely, and could also abduct his thumb completely by the mere force of his will, and when the hand was in a passive state it was quite straight in relation to the forearm. Simultaneously with these improvements the strength of the limb was greatly increased. In several other cases I have also succeeded in overcoming muscular rigidity of long standing; and my experience of the wonderful power of the ice-bag in the treatment of this hitherto intractable malady is now confirmed by that of Dr. Hewitt, of Dublin, who says (April 13, '68,) "I have used the ice-bag in a case of hemiplegia, in which the fingers were strongly flexed, and the wrist bent on the arm. In this case the rigidity was removed, and the patient recovered the use of her fingers sufficiently to enable her to hold a needle and sew."‡

2. *Sensibility is lessened by the application of cold along the*

* In the *Medical Press and Circular*, March 27th, 1867.

† For full Report see *Medical Press and Circular*, Sept. 11th, 1867.

‡ *Medical Press and Circular*, April 22nd, 1868.

spine. This is proved conclusively by my experience, which has been considerable, in the treatment of neuralgia. Concerning the pathology and treatment of this disease I read a paper to the Harveian Society, November 21, 1867 : a summary of this paper appeared in the *Medical Press and Circular*, December 11, 1867 ; and in the same journal (4th March, 1868) I published a report of fourteen cases which I had treated successfully, chiefly by means of ice. Any one reading that paper and those cases can scarcely fail, I think, to be convinced that while the method at once the most scientific and successful of treating neuralgia consists in exerting a sedative influence over the nervous centres related to the painful part, ice applied to the appropriate part of the spine is preeminently capable of constituting that influence, and that thus applied it does in fact cure hyperæsthesia—or, in other words, lessen sensibility. On this point, however, I am able to cite only one professional witness in confirmation of the proposition in question. In the course of the discussion at the Harveian Society on the paper just referred to, Dr. Drysdale, "after observing that he was known to be sceptically inclined, said that he must confess to having recently witnessed in two cases the efficacy of Dr. Chapman's therapeutical method." He then described to the Society two cases of neuralgia which were under his own care at the Farringdon Dispensary, and which, having been treated according to my recommendation by means of the spinal ice-bag, were cured, he said, by the use of it without the help of medicines.*

3. *Secretion is lessened by the application of cold along the spine.* I have assured myself by experience in numerous cases of the truth of this proposition. Morbidly excessive sweating, bronchorrhœa, the excessive action of the alimentary mucous membrane constituting the chief cause of diarrhœa, excessive action of the kidneys, leucorrhœa, and spermatorrhœa, I have restrained over and over again by cold properly applied to the appropriate part of the spine. In proof of the efficacy of the spinal ice-bag in cases of morbidly excessive sweating and of bronchorrhœa, I am enabled to cite the evidence of Dr. D. B. Hewitt : respecting a case of delirium tremens which he treated (in February, 1868) by means of the spinal ice-bag, he says,—"I found the patient [before ice had been used, and after drugs had proved of no avail] pale, tremulous, *sweating, with a cold, clammy skin,* and great exhaustion marked on his face. . . . . In the

* *Medical Press and Circular*, Dec. 11th, 1867.

evening [after the ice-bag had been applied two hours] I found him *free from the slightest trace of sweating,* the surface was of an uniformly good temperature, the pulse had lost all its feebleness," &c. &c. The same physician states, that in the case of a man suffering from chronic bronchitis, and who was treated by the spinal ice-bag, "*there was considerable diminution in the amount of the expectoration,* and in the severity of the cough during the application of the ice; and it was remarked to me by the patient that he had only coughed twice during the three hours he was under treatment."* That ice along the spine will stop diarrhœa, and, therefore, the excessive action of the intestinal mucous membrane, is an established truth, in confirmation of which I may cite the testimony of Dr. Lake, Dr. Griffin, Mr. Bencraft, Mr. Williams, and Dr. J. Waring-Curran, already mentioned; also that of Dr. Moorhead, of Weymouth; Dr. Fitzgibbon, of the West India steamship *St. Thomas;* Dr. J. S. Hackett, of New Amsterdam, Berbice, British Guiana; Dr. Munro, of Forres; and Dr. Wilson, of Philadelphia. The fact that excessive secretion of urine may be arrested by the spinal ice-bag, has not yet been observed, I believe, by any one besides myself; but nevertheless it is a fact, as real as any of those in proof of which I am able to adduce the testimony of several medical witnesses. That ice exerts a restraining power over the morbidly excessive secretion of the spermatic glands I have proved in several cases; Dr. de Faye has kindly sent me particulars of his successful treatment of a case in the same way; Dr. Ramsey, when visiting me, told me that he had verified my statement of the efficacy of the spinal ice-bag in this disorder; and a young medical man from Dublin, who also called upon me recently, informed me that in one of the hospitals there (I forget the name of it) this affection had been treated with success by the same method.

The arrest of the excessive secretions constituting leucorrhœa by means of the spinal ice-bag, was effected for the first time in a case reported at length in my book on "The Functional Diseases of Women." Since that time my successful treatment of a large number of cases of the same malady by the same method assures me that the action of the mucous surfaces of the female reproductive organs are no less completely under the direction of the spinal cord than are the other secreting structures already adverted to. But as yet I know of only three medical men besides

* *Medical Press and Circular,* April 22nd, 1868.

myself whose experience enables them to confirm my statement that leucorrhœa may be cured by lowering the temperature, and thus lessening the activity (generally the *reflex* activity) of the lumbar segments of the spinal cord. Dr. Hayle, referring to "a case of chronic metritis," wrote to me (July 2, 1865,) "A transparent yellow discharge from the uterine cavity, which the patient had had for years, has been nearly arrested." Dr. Drysdale stated to the Harveian Society, that one of his patients at the Farringdon Dispensary who was suffering from neuralgia, and at the same time from "copious leucorrhœa," and who was treated as I suggested by means of ice, returned to the Dispensary "at the end of about a week" after the treatment began and "stated that she was cured, *the discharge*, as well as the pain, *having been completely stopped*." And Dr. Edmunds has informed me that a medical friend of his (whose name I have forgotten) tried the effect of the lumbar ice-bag in a chronic case of profuse and peculiarly obstinate leucorrhœa, and that the bag "acted like a charm" and quickly effected a cure.

The peripheral circulation, and consequently bodily heat, are increased by ice applied along the spine. My writings teem with facts proving this cardinal, and, from a medical point of view, unspeakably important proposition. In the Section on "Coldness of the Feet, and its cure by means of Ice," forming part of the book on the "Functional Diseases of Women," there are many cases of this kind. I shall therefore only adduce here two cases treated by myself, which, however, prove in a striking manner the reality of the phenomenon in question. In that Section is an account (see Case XIII.) of a woman, aged sixty, who for more than twenty years "had always been cold to the touch, even over her shoulders and bosom, although she was warmly clothed; and her feet were habitually and extremely cold." After using ice during three weeks, several hours a day, the whole surface of the body, including her feet, became wonderfully warm. She was extremely astonished by the increase in the temperature of her body, as well as by the subsidence of every symptom from which she had suffered for so many years, and when she called upon me a week after the treatment had ceased, her newly-acquired increase of general circulation, denoted by her increased warmth, still continued. In the *Medical Press and Circular* for May, 1867, I published a paper previously read to the Harveian Society, and entitled: *Paralysis: cases illustrative of a new Method of treating it by the application of Cold or Heat along the Spine.* Case 2 of this

series affords a remarkable proof of the proposition in question: the patient, a man, aged fifty-six, who seemed nearer seventy, suffering from paralysis, epilepsy, and other grave troubles, complained that he was always "cold all over;" that he suffered especially from coldness of the feet, even in the hottest weather, and was obliged, as his wife said, "to sit near the fire in summer." Within one week after the treatment, which was continued three months, began, this patient had become warm all over—the feet being especially warm. Within a month he said: "I feel as well as possible, but very hot, very hot." In this case, after the ice had been left off for some days, the patient became cold again.

As soon as I had verified in the first instance the truth of the proposition proved by the cases just mentioned, I pointed out its immensely wide applicability as a remedial principle; but being assured that any special insistence on its general applicability would rather retard than hasten its acceptance by English minds, I resolved as a first step to publish a monograph illustrating the operation of this principle in respect to one special function where the effect of its application is so striking as to be unmistakeable by the least thoughtful observer. And meanwhile I restricted the announcement of the general principle itself to the preface and appendix of that monograph, which dealt exclusively with the *functional diseases of women.* It seemed to me that if medical men could be tempted to repeat my experiments described in that monograph, and could thus assure themselves that by a suitable application of ice along the lower part of the spine of a woman they could produce an afflux of blood in the womb, and could thus promote, increase, and often rapidly bring on the menstrual flow; and, conversely, if, by a suitable application of heat in the same region, they could retard, lessen, and even arrest that flow, they would by these two striking facts have their curiosity forcibly awakened, and would thus be led to reflect on their great significance, and ask themselves the question—Is not this newly-discovered power, the remarkable operation of which in relation to the uterus is so totally opposed to all preconceived ideas and experience, equally applicable as a remedial agent to each of the other parts of the organism? It is now more than five years since I published that monograph, and my experience in the interval of the reception of the doctrine it announced has fully justified the plan I adopted. I may refer to several medical practitioners who have informed me of their verification of the truth of my statement concerning the effects of the spinal ice-bag on the

uterine circulation—viz., Dr. Brereton, of Sydney; Dr. de Faye, of Brussels; Doctor J. H. Benson, of Dublin; Doctress Densmore, of New York; and Miss Firth, lately Matron of the Endell-street Maternity Hospital. Dr. Benson has published his case, which is a very convincing one, in the *Medical Press and Circular*, April 4th, 1868. One of the most interesting proofs yet adduced of the power of the spinal ice-bag to increase the peripheral circulation is that afforded in the shape of its indisputable effects on the eye. I have been able in several instances to improve vision to a very remarkable extent* by acting on the spine; and in October, 1864, having accidentally met at the Turkish bath Mr. Ernest Hart, whom I knew to be devoting himself especially to diseases of the eye, I communicated to him the result of my observations, and begged him to give the subject of the influence of cold and heat when applied to the cilio-spinal region on the circulation in the eye his special attention. He kindly promised to do so; and, in the *Lancet* of January 7th, 1865, he published a very remarkable case entitled, "On a case of Amaurosis from progressive Atrophy of the Optic Nerve with Epileptic Complications treated successfully by the application of Ice to the Spine." The patient, a lady, thirty-three years of age, healthy until she was twenty, then began to suffer from frequent and sometimes intense headaches. When twenty-one she had three severe epileptic fits, two years after she had another, and gradually they became so frequent that at the time when the treatment in question began, "the attacks recurred sometimes twice or thrice in a week, lasted for an hour or an hour and a half, and left her with a severe headache which prostrated her during the day." Her sight gradually declined; "and," says Mr. Hart, "when she came to me she could with difficulty read No. 10 of Giraud-Teulon's type. The ophthalmoscope showed palpable whiteness of the optic discs in both eyes. . . . . The pupils were semi-dilated, and did not contract fully under ophthalmoscopic examination. . . . . I could give no hope of cure. However, after a fortnight of temporizing without benefit I resolved to employ for her treatment the application of ice to the lower cervical and upper dorsal regions of the spine, which has been . . . recommended by Dr. John Chapman as a means of increasing the afflux of blood through the agency of the sympathetic." The ice-bag was applied during five weeks, generally three times a day, and for about half an

* See especially the Case of Epilepsy, with Defective Vision, &c., described at page 58 of my pamphlet on *Functional Diseases of Women*.

hour each time. She had only three fits during this period, and they were comparatively slight. The remainder of the account I give in Mr. Hart's own words. "That which most nearly touches the subject of my paper, however, is the great improvement which has occurred in her visual power. At the beginning of the treatment she could read no type smaller than No. 10 of Giraud-Teulon: she now reads No. 4 with ease. The pupils are no longer dilated, although they act sluggishly. But a point of great interest is, that the discs are now of a tint which may be pronounced natural; they are palely roseate. . . . From a physiological point of view, this is remarkable as an example of visible regeneration, so to speak, of a nerve in process of wasting from disordered nutrition. Nothing else than the ophthalmoscope could have shown it; and nowhere but in the eye could it have been seen, for nowhere else is a living nerve subject to observation."

The length to which this introduction has already extended, compels me to make my general remarks on the effect of heat applied to the spine, much briefer even than those which I have submitted to the reader concerning cold.

Muscular tension is increased by heat applied to the spine. As I have stated in my paper on the treatment of epilepsy—"at least some epileptic patients are predisposed to have fits by the application of heat along the spine. The reason no doubt why heat along the spine does not induce action of the voluntary muscles is, that the will which holds them quiescent is the predominant power. Epileptics whose tendencies to convulsive movements are increased by heat along the spine, do not *show* these tendencies, but *complain* that they have 'fit feelings.'"

Sensibility is increased by heat along the spine. Purely physiological demonstrations of this proposition will, I apprehend, be difficult. Pathological proofs of it I have several times witnessed; one of them I will mention. A married woman, aged thirty-two, suffering from neuralgia of the four extremities and of the left side of the chest, together with other troubles, consulted me early in January, 1868, at the Farringdon Dispensary. I treated her successfully, and by February 5th she was quite free from neuralgia; but then complained that she was suffering from a slight cold and a cough, which had troubled her much during the last two or three preceding nights. I requested her to omit the ice for a week and to apply the double-columned water-bag, containing water at 120° Fah., between the scapulæ when going to bed; *but warned her to expect some return of neuralgia in the hands.* I saw her again

February 15th, when she said she obtained immediate relief in her chest from the use of the warm water-bag; and added, "Since leaving off the ice my feet have become cold again; *my back is beginning to ache; a little pain has come back in my hands;* and I have made a very great deal of water again." It will be observed that in this short sentence is comprised evidence of the action of heat in contracting the peripheral arteries (thus causing coldness of the feet), in increasing sensibility, and, also, glandular activity.

Secretion is increased by heat along the spine. During the first stage of bronchitis, when there is a sense of tightness across the chest, and an absence of expectoration, with a distressing feeling of dryness of the bronchial tubes, the application of a double-columned water-bag at from 115° to 120° Fah. along the dorsal spine generally gives rapid relief, as it did in the case just mentioned, and at the same time promotes the secretion of bronchial mucus. This fact I have often verified. I have also in several instances, by the application of heat along the lower half of the spine, produced diarrhœa, of which of course excessive secretion of intestinal mucus is a chief element. I have also observed on many occasions in cases when the skin was hot and dry, that the application of heat along the spine caused it to become at once cool and moist.

So far as I am aware no evidence from other medical men in support of the three preceding propositions is as yet forthcoming.

The peripheral circulation, and therefore animal heat, is lessened by heat applied along the spine. This truth is most conclusively exemplified in respect to the uterine circulation. In the monograph already frequently referred to, there is a Section entitled "Menorrhagia and Menorrhagic Pain: their cure by means of Heat." That Section contains six cases proving that heat applied along the spine will, as already said, not only lessen, but arrest the menstrual flow. I have also satisfied myself, by trial in several cases, that heat properly applied to the spine will not only produce the effect just stated, but that it will restrain hæmorrhage from the nose and from the lungs, and will cause the temperature of the surface of the body to fall. In support of this proposition I am able to cite the following witnesses—viz., Dr. Routh, Mr. Hammerton, Professor MacLean, Professor Beneke, Dr. Fuller, Dr. Goolden, Dr. Hayle, Dr. Brereton, Dr. Rayner, Dr. Barber, Mr. P. Harper, Miss Firth, and Mr. Ernest Hart who has assured me that in a case of congestion of the retinal blood-vessels, causing intermittent amaurosis which had pre-

viously withstood the efforts of several of the most eminent oculists in London, the symptoms were completely subdued by means of heat applied over the 'cilio-spinal' region. In this case, as in that already mentioned under the care of Mr. Hart, the ophthalmoscope, as well as the experience of the patient, revealed the curative effect which the spine-bag had produced.

Considering the amount and character of the evidence now tendered in support of the propositions given at page 22, all unprejudiced readers will, I believe, feel constrained to recognise them as fairly established. The kind of practical changes which those doctrines, when accepted, will introduce have already been incidentally illustrated in the immediately preceding paragraphs. I will endeavour to show, however, by a few additional examples, the nature of that 'medical reform' which a belief in the truth of the propositions in question will inaugurate.

There are various forms of disease consisting in anæmia, or deficiency of blood, in the different parts of the body. In some cases the disorder is limited to one part of the body—for instance, the lower extremities, which are then habitually, and hitherto as a general rule incurably cold. This form of local deficiency is experienced by a vast number of persons, especially of the female sex. A form much rarer but, perhaps, much more deeply interesting, is that of anæmia of the retina—one of the most frequent proximate causes of that hitherto incurable kind of blindness amaurosis. In some cases the anæmia is general, and differs greatly in different cases in respect to the rapidity with which the disorder comes on, the extent of its duration, and the frequency of its recurrence. The deadly pallor, coldness of the surface, and, to a great extent, cessation of vital action, caused by a violent shock; the like phenomena known as a fainting-fit, induced or not by an obvious cause, and having a tendency to recur at more or less frequent intervals; the fall of bodily temperature of all degrees, from that of mere coolness of the skin to that of the so-called "icy-coldness" of "collapse," and the not less numerous degrees of muscular and cerebral weakness, ranging from mere languor to total prostration, which are associated with disorders of the stomach and bowels in those kindred maladies—diarrhœa, choleraic-diarrhœa, cholera, and sea-sickness, are all expressions of general peripheral anæmia, the immediate cause of which, according to the doctrines in question, is exces-

sively energetic action of the sympathetic nervous centres, and which, instead of being treated, usually in vain, by drugs of various kinds, will be simply and effectually subdued by the application of cold over those centres.

On the other hand, the number of morbid phenomena consisting of an excessive afflux of blood in the region affected is very great; and those resulting from weakness or exhaustion of the negative motor nerve-centres are especially numerous. Hyperæmic, or plethoric, headache; pulmonary hyperæmia or congestion, often resulting in sanguineous effusions into the air-cells, and in sudden and copious hæmorrhage from the lungs of persons wholly free from a consumptive tendency; undue and often very rapid enlargement of the mammæ; congestion of the womb, and uterine hyperæmia—not seldom so excessive as to result in menorrhagia; excessive afflux of blood in the enteric mucous membrane, sometimes causing copious discharges of blood *per anum*,—are all disorders which, though manifesting themselves in the several regions named, are truly referable to a morbidly feeble action of the sympathetic nervous centres related to and regulating the blood-vessels of those regions. Now obviously this neuro-pathological interpretation of these phenomena involves as its logical consequence the abandonment of opposite and long-cherished hypotheses concerning them, together with much of the treatment which those hypotheses have dictated, and at the same time points out that the most scientific and reliable remedy will be found in the suitable application of heat, by which the amount of blood in and consequently the energy of the nervous centres in question can be increased. And these remarks apply even to certain cases in which peripheral hyperæmia extends throughout the system, and of which the reactionary fever following the collapse of cholera may, in my opinion, be regarded as the most perfect type. The several kinds of peripheral hyperæmia here referred to are, however, more or less completely distinct from that which, in its most developed form, is characteristic of true inflammation, though they constitute the border-lands of that state: their true nature is most like to that artificial hyperæmia which is produced in an animal by division of the sympathetic, and which has been described in a previous page. In short, these examples of hyperæmia are what pathologists have admirably distinguished by the word *passive*, and are mainly due to the fact that the negative motor nerves of the affected region have become *passive* through anæmia of the centres from which they emerge,

Active hyperæmia, produced by the positive motor nerves, assumes many forms, both local and general. Among these may be mentioned all kinds of locally excessive nutrition resulting in swellings or tumours, all cases of local inflammation, all skin affections of an inflammatory character, or in which excessive cell-nutrition is a distinctive feature, and all those forms of fever in which the spinal cord is predominantly active. The best type of these fevers is what I call cerebro-spinal fever, and which is commonly known as cerebro-spinal meningitis, or "black death." Any medical reader who considers what a vast number of diseases is comprised in the group here referred to, how heterogeneous and chaotic are the prevailing pathological views concerning them, what a vast variety of drugs and other expedients are resorted to as the means of treating them, and how powerless those means are to exert a direct, certain, and salutary influence on the part of the organism—"the true spinal cord," as Dr. Marshall Hall calls it—the hyperæmic state of which is the immediate cause of the various diseases in question, will readily comprehend the extent of the change implied in the doctrine that the proximate cause of these diseases, whatever may be their ultimate causes, is seated in the "true spinal cord," and that the operation of that cause may be most effectually counteracted by constringing the blood-vessels of a part or the whole of the cord, according to the nature of the special case in question, by the use of cold along the spine, applied as exclusively as possible over the cord itself.

The doctrine that the spinal cord is the source of all glandular action is the harbinger of a revolution, not less complete than the one just mentioned, in our conception and treatment of those diseases in which functional disorders of glands play a chief part. An idea of the magnitude of the change impending may be obtained from the statement which, by way of example, I now make with an assurance gained from experience, viz., that the method incomparably the most successful of treating parotitis, bronchitis, bronchorrhœa, functional disorders of the stomach, diarrhœa, dysentery, excessive secretion of urine, leucorrhœa, disorders of the menstrual function, and spermatorrhœa, consists in suitably modifying the temperature of the appropriate region of the spine.

The pathology of the majority of those maladies ordinarily described as diseases of the cerebro-spinal axis is, indeed, already well understood, but the remedies for them now generally resorted to by the most skilful physicians are deplorably in-

adequate and unsatisfactory. Fortunately I can affirm, with the utmost confidence—also based on experience—that the therapeutical system in question is pre-eminently available and efficacious in the treatment of these disorders, whether they be, according to current phraseology, "functional" or "organic." The power over the circulation, and therefore over the diseases of the brain, which this system confers is very remarkable. There is an exceedingly important group of disorders of the spinal cord, including epileptoid and paralytic affections, in which the amount of blood circulating in it, and in its membranes, exceeds that of health, and in which, according to the degree of excess, the condition of the organ ranges between the limits of acute inflammation and merely undue functional activity. The number of abnormal phenomena resulting from the various degrees of this vascular excess is surprisingly great; while the power of any known medicines to reduce that excess to the normal standard is lamentably small. Now for all forms of disease produced by the cause in question the least injurious, most scientific and indubitably most efficacious remedy is cold applied along the whole or some part of the spine—cold varying in intensity, and applied during various lengths of time, according to the nature of the disease under treatment. By this method the blood-vessels of the cord and of its sheath may be contracted, and by thus lessening the amount of blood in them, the diseases dependent on vascular excess may be most effectually combated.

The opposite condition, or anæmia of the spinal cord, is comparatively rare; and its symptoms, except in certain forms of paralysis, are obscure and but little understood. In so far, however, as the physician can assure himself that the proximate cause of any given malady—paraplegia, for example—consists in a deficiency of blood in the cord, he may hope by the application of heat alone,* or by heat and cold alternately, or by cold and vigorous friction (which evolves heat) to the spine, to confer more benefit than is derivable from medicines.

The following is a list of diseases which, as I am able to certify, have already been treated successfully, either by myself or by physicians known to me, by modifying the temperature of some part or the whole of the region of the spine. The diseases are named in the order in which they occur in Dr. Farr's classification; and in a parenthesis following the name of each disease

* In most cases the application of heat alone is injudicious.

I have stated by whom it was treated. My own name is denoted by my initials only.

Mumps (J. C.). *Ague* (J. C.). *Influenza* (J. C.). *Dysentery* (J. C.). *Diarrhœa* (J. C.; Dr. Williams, surgeon, Liverpool; Dr. Moorhead, Weymouth; Dr. Wilson, Philadelphia; Dr. J. Waring Curran, Bexhill; Dr. Fitzgibbon, of the West Indian steamship *St. Thomas;* Dr. J. S. Hackett, New Amsterdam, Berbice, British Guiana). *Cholera* (J. C.; Mr. Bencroft; Dr. Griffin; and Dr. Lake, of Southampton; Dr. Carpenter, Croydon). *Diabetes mellitus* (J. C.). *Asthma* (J. C.; Dr. de Faye). *Spitting of blood* (J. C.; Professor Beneke, of Marburg). *Inflammation of the spinal cord* (J. C.; Professor Morgan). *Apoplexy* (J. C.). *Palsy* (J. C.; F. Broughton, F.R.C.S., surgeon-major, Bombay Army; Dr. H. Benson, and Dr. D. B. Hewitt, Dublin; Dr. Blake, Leamington; Dr. E. R. Townsend, jun., Cork). *St. Vitus' dance* (J. C.; Wm. Cross, surgeon, Clifton; Dr. H. Benson). *Delirium tremens* (J. C.; Dr. N. J. Butler, Dr. D. B. Hewitt, and E. Hamilton, F.R.C.S.I.,* of Dublin). *Insanity* (J. C.; Dr. Brereton, Sydney; Wm. Cross, surgeon, Clifton; Dr. O'Ferrall, Dublin). *Epilepsy* (J. C.; Mr. Ernest Hart; Dr. de Faye; Dr. Griffiths, Camberwell; Dr. Barber, Ulverstone; Dr. Bunts, Woodford). *Hysteria* (J. C.). *Lockjaw and allied affections* (Dr. Todd; J. C.; Dr. Edmunds; Dr. J. Ogle; Dr. Roberts, Northallerton; Mr. Hargrave, Dublin). *Convulsions* (J. C.; Dr. Routh; Dr. Rogers; Dr. J. Waring Curran; Dr. de Faye). *Laryngismus stridulus* (J. C.). *Neuralgia* (J. C.). *Amaurosis* (J. C.; Mr. Ernest Hart.) *Fainting fits* (J. C.; Dr. W. S. Playfair). *Bleeding at the nose* (J. C.). *Inflammation of windpipe* (Dr. Barber). *Bronchitis* (J. C.). *Pleurisy* (J. C.). *Congestion of the lungs and pulmonary apoplexy* (J. C.). *Constipation of the bowels* (J. C.; Dr. Barber; Dr. J. Williams, Macroom). *Lead colic* (Dr. de Faye). *Indigestion* (J.C.). *Persistent vomiting* (J. C.). *Hæmorrhoids* (J.C.). *Retention of urine, Excessive secretion of urine, Incontinence of urine* (J. C.). *Muscular atrophy* (J. C.; Dr. E. R. Townsend, jun.). *Nettlerash* (J. C.). *Chilblains* (J. C.). *The sickness of pregnancy* (J. C.; Dr. Routh). *Suppression of menstruation* (J. C.; Dr. J. H. Benson). *Dysmenorrhœa* (J. C.; Dr. de Faye; Dr. Fuller; Doctress Densmore; Miss Firth). *Menorrhagia* (J. C.;

* Mr. Hamilton, one of the surgeons to Steevens' Hospital, Dublin, has published in the *Medical Press and Circular*, September 30, 1868, three cases, which exemplify in the most striking manner the perfect efficacy of the spinal ice-bag as a remedy for delirium tremens.

Dr. Fuller; Dr. Goolden; Professor McLean; Dr. Harper; Dr. Rayner; Mr. Hammerton; Miss Firth). *Leucorrhœa* (J. C.; Dr. Drysdale; Dr. Hayle; Dr. Edmunds). *Spermatorrhœa* (J. C.; Dr. de Faye; Dr. Ramsay). *Disorders of the nervous system incident to the turn of life* (J. C.).

There is one fact which is especially notable in respect to the remedial method in question, viz., that experience has proved it to be peculiarly successful precisely in those diseases in the treatment of which all known drugs have been proved most impotent; and to no disease is this remark more applicable than it is to sea-sickness.

Those of my readers who duly consider the nature of sea-sickness in the light in which it is discussed in Section III. of this book, will see that that very complex malady when thoroughly analyzed may be resolved into the several morbid phenomena which I have shown to be producible by heat when applied along the spine. In fact, a very good imitation of the disease, and comprising all its elements, may be artificially produced by heat thus applied. And as this disease pervades the whole body—disordering alike the functions of the nervous, muscular, glandular, and circulatory systems—the only efficacious remedy for it must be one the power of which is co-extensive with and equal to that of the disease itself, and must be at the same time capable of influencing each of those systems in a manner precisely opposite to that in which heat, as well as the cause of sea-sickness (as will be shown hereafter), operates. Happily, cold applied by means of the spinal ice-bag, can, as I have fully demonstrated, do all these things.

But no reflecting physician who sees that the functions of the nervous, muscular, glandular, and circulatory systems, and therefore the processes of textural nutrition, can be increased or lessened by modifying the temperature of the spinal region, will need the evidence adduced in the preceding pages in order to convince him that a power capable of influencing these several functions is also capable of acting remedially, and to an unprecedented degree, on the great majority of diseases; for he knows that whatever may be their causes, whatever organs or structures they may affect, they actually consist in disorder of some one or more of those functions. These considerations prompted the declaration of Dr. Routh at the London Medical Society, that the facts I have established "open up the prospect of a great therapeutical revolution." Other medical men who have also thoroughly grasped the general principles in question have expressed themselves to the same effect. Dr. Brereton, of Sydney, addressed me as follows:

"I have fully satisfied myself of the great value of your discovery—a discovery not of a few isolated facts, but of a *principle* of treatment, capable of most varied application, and like all principles, likely to lead to further, and as yet unimagined results." Dr. Shuldham, of Maidstone, who has also seen and proved for himself the nature and importance of the principle in question, writes: "I think we cannot consider ourselves too deeply indebted to you for having struck the great idea of the therapeutic power of heat and cold when applied to the spinal tract. A good many of our side have tried your ice and hot water bags with good results. Dr. Collins, of Leamington, only a short time ago at a homœopathic meeting spoke in glowing terms of your system. It deserves a college and professorships of itself." Dr. Hayle, who kindly sent me the case of sea-sickness numbered XVIII, wrote at the same time,—"I take this opportunity of thanking you for a very effective additional means of combating disease. Your discovery opens up a wide field of speculation as to the primitive and secondary action of medicines."* Dr. O. Ferrall, the senior physician of St. Vincent's Hospital, Dublin, after informing me that he had found the spinal ice-bag "very efficient in many cases of painful spasmodic affections seeming to depend on irritation of some portion of the spinal cord," and that in "a remarkable case of strabismus which had occurred during hooping cough" he had effected a cure by the same means, observes, "the details of these cases are certainly calculated to support your views of the therapeutic effect of the agent in question." Dr. J. Waring Curran, in his report published in the *Medical Times and Gazette*, of several cases of "Diarrhœa with Convulsions" cured by the application of cold along the spine, remarks, "The results happily obtained in my treatment of the foregoing cases, have convinced me of the great practical importance of Dr. Chapman's teachings, and constitute indisputable proofs that cold applied as he recommends exerts a great remedial power." "This grand object—a new therapeutic agent in our hands by which to control disease—seems to have been accomplished in a very simple way by Dr. Chapman, and by the use of heat or cold to the spine a great number of diseases seem capable of being successfully treated. This power, moreover, extends not only

* I believe Dr. Brereton and Dr. Hayle, as well as Drs. Shuldham and Collins, are homœopathists; but I suppose their testimony in respect to what they have seen will be accepted, however strongly their medical creed may be reprobated by 'orthodox' physicians.

to nervous diseases universally so called, but also to many of those which, previous to his discovery, were never considered to have had any causal relation to a deranged state of the nervous centres."*

I make no apology for printing these statements; for though they are gratifying to myself, I think it incumbent on me to run the risk of being charged with vanity if by the exercise of this moral courage I may, as I hope I shall, the more effectually constrain attention to a method of healing which, if widely known and practised, would immediately, as I believe, abolish an incalculable amount of human suffering which hitherto the art of medicine has been powerless to subdue. And I feel it the more needful to publish these evidences of appreciation of the general principle in question, because several medical men who have experienced the efficacy of the therapeutical method expressive of that principle in the treatment of only one disease, or one group of diseases, are wont to speak of the spinal ice-bag or the spinal water-bag as merely "a valuable empirical remedy,"—a deplorable mistake, made of course most frequently by men with little aptitude for generalization, but sometimes also by physicians of the highest rank, one of whom about a year ago showed his total ignorance or total scepticism of the existence of that principle by asking me if I had tried whether ice over the stomach would not produce the same effect as that produced by it when applied over the spine! I am happy, however, to be able to add that this same physician has since learnt the wisdom of restricting spine bags to the spine, and that he is now, as he says himself—"using them constantly."

But indeed it is astonishing how few medical men have hitherto availed themselves of this remedial method even for the treatment of those diseases for the cure of which drugs are confessedly powerless; and fewer still have exhibited any real appreciation of the general principles which have dictated that method. The recognition and practical application of new truths are however notoriously slow processes. Harvey's beneficent discovery of the circulation of the blood excited vehement opposition from his contemporaries; and the man whose professional opinion was more respected, probably, than that of any other physician of his time, who was one of the greatest anatomists then living, and whom alone among the adversaries of his discovery Harvey condescended

* Dr. J. H. Benson. *Proceedings of Surgical Society of Ireland*, March 13, 1868, reported in *Med. Press and Circular*, April 8, 1868.

directly to reply to, viz., John Riolan, Professor in the Faculty of Paris, combated with as much violence as obstinacy not only the discovery of the circulation of the blood, but also that of the existence and functions of lymphatic vessels. Even the illustrious Harvey himself made common cause with Riolan in opposing the discoveries of Aselli and Pecquet, respecting the lymphatic system. Jenner's discovery of the power of vaccination likewise provoked a storm of objections from his own professional brethren, some of whom afterwards showed an inclination to contest with him the honours of his triumph. In 1800, Humphry Davy announced that, "as nitrous oxide, in its extensive operation, seems capable of destroying physical pain, it may probably be used with advantage during surgical operations;" but forty-four years had to elapse before the value of this vastly beneficent truth was recognised; and, even then, Mr. Wells, the man who saw it and actually applied it, was so overwhelmed with ridicule after the partial failure of a public experiment, that he abandoned the subject altogether, and afterwards committed suicide. When, in 1846, Morton succeeded in producing anæsthesia more satisfactorily by means of ether than Wells had by nitrous oxide, he was assailed with coarse vituperation by several of the American medical journals, among which a leading one, published in Philadelphia, was "fully persuaded that the surgeons of Philadelphia would not be seduced from the high professional path of duty into the quagmire of quackery by this will-o'-the-wisp." Quickly following Morton's demonstration of the anæsthetic power of ether came Sir James Simpson's application of chloroform for the same purpose, and his ever-memorable adoption first of ether, then of chloroform, to annul the sufferings of women during labour. But the proposals to annul the pain of surgical operations, and of labour, were alike opposed by many eminent members of the profession on the ground that pain is salutary, and that its annihilation would be hazardous to the patient. Even the great Magendie argued that to suffer is a trivial matter, and that a discovery how to prevent pain was of slight interest! Considering only the opposition offered to the great medical discoveries just mentioned, and the history of their reception, I feel that I have abundant reasons for satisfaction with the amount of recognition already afforded to my efforts to introduce a remedial method, which at no distant time, will, I believe, be universally practised. It is only five years since I first called attention to it, and already it is used to a considerable extent in England, Ireland, and America; it is also

practised in India, Australia, New Zealand; and though French physicians have as yet paid but little attention to it, many cases have been treated by it successfully in Brussels, and several German physicians are taking a lively interest in it.

I am painfully aware, however, that the great body of medical men evince toward it only profound apathy. It is said that a certain proportion of them become so surfeited with reading before getting their diplomas, that they retain no appetite for it afterwards :* to such, of course, if there be such, the advances made in the science and art of medicine are as if never made at all. Then there is, undoubtedly, a large class of practitioners who, though they read with due regularity their weekly medical journal, and thus keep themselves, in a general way, *au courant* with what is passing in the medical world, are prevented by their conservative instincts from becoming mentally hospitable to the new ideas and methods of which they read; and even if the question of applying those ideas and methods in their own practice should occur to them, it is most likely to be negatived by the objections that to do so would require time and study, a departure from routine, and that "it is not worth while." For different, but equally cogent reasons, the so-called "heads of the profession" are indisposed to extend a cordial welcome to doctrines threatening with revolution a great part at least of the principles and practice of medicine which they deem orthodox, of which they are the most eminent representatives, and of which in many instances they are, both by their lectures and published writings, the chief exponents. A man who after long years of incessant study and laborious practice has reached the highest position in his profession—who in fact sums up, organized in his own person, the knowledge and experience of his time until the period of his own full maturity—is, generally speaking, indisposed to imagine the development of new truths in regions with which he reasonably supposes himself well acquainted, and he is certainly not likely to recognise them if they seemingly controvert his own opinions, or in any degree supersede his own teachings. It is to men of this order—but twenty years younger—men who have not yet made their reputation, but who are making it, that the medical innovator can look with the most justifiable hope of appreciation and recognition. The men whom he has most reason to fear are those semi-scientific

* A newly-fledged surgeon, who had been "plucked" twice, and who "passed" with "fear and trembling," exclaimed to me immediately afterwards,—"I shall now go home and burn all my books!"

or pseudo-scientific gentlemen, who are great in the parade of scientific instruments; who observe much, but reflect little; whose cleverness outweighs their wisdom; whose conscious self-sufficiency lures them into the belief that they alone are possessed of the true method of scientific investigation, and emboldens them to pronounce judgment on matters, even when they have not examined them at all, with an air of confidence and scientific correctness which inspires perfect trust in the great majority of those who listen to them. These pre-eminently "scientific" physicians will demonstrate in the most approved scientific language that ice applied along the spine cannot possibly affect the spinal cord; and their demonstration is so complete in itself that it needs no confirmation by the simple expedient of applying a spinal ice-bag along the spine of a living man or woman, and noting the results. If an attempt is made to rebuke their scepticism by an appeal to facts—by adducing a large number of well-authenticated cases in which the spinal ice-bag effects cures—cases of sea-sickness, for example—they complacently reply that cures result in abundance from all sorts of expedients; that if ice to the spine effects cures, the fact affords no presumption that it affects them by modifying the circulation in the spinal cord and sympathetic ganglia, as I affirm it does; and that if such cures do really result from my method of treatment, they merely prove that I have introduced a valuable empirical remedy, but by no means sustain my claim to having established a new therapeutical principle. None are so blind as they who will not see. It is impossible to answer objections advanced on *à priori* grounds by men who refuse to appeal to and abide by the only unquestionable authority in this case—therapeutical experiment. The experiments they ask for, viz., *thermometrical* demonstrations that heat or cold along the spine is capable of modifying the temperature of the spinal cord, cannot possibly be given in any form having the least reliable value: even though a thermometer be thrust into the vertebral canal of an animal without killing it, the horrible injury inflicted would produce such tumult in the circulation of the blood in the nervous system as would wholly vitiate the experiment of placing cold or heat along the spine, and noting its effect on the temperature of the cord. But as I do not offer this kind of proof, though I offer physiological proofs in abundance—for example, the proof afforded by the fact that ice applied along the spine will abolish cramps of both the voluntary and involuntary muscles—these gentlemen,

ignoring the only proofs available, persist in repeating their objections, and, speaking with the authority born of their own self-assurance, their dicta are accepted with like faith by their admirers. And thus it is that the true scientific method—real experimentation as the basis of sagacious reasoning, both inductive and deductive—is neglected by a large number of practitioners who, were they not misled by their unduly-trusted guides, would, in respect to the therapeutical power of spine-bags, as in many other respects, find out the truth for themselves.

A common objection of another kind to the doctrine in question, and one very difficult to answer, is that it is "too good to be true,"—a judgment several times expressed, and recently repeated by an appreciative critic in the *Athenæum*;* but of all stumbling-blocks in the way of the professional reception of that doctrine the greatest consists in the obscurity of its author. The kind of welcome accorded to a new truth during the life of its first promulgator depends, to a very great degree, on the character of his own position. If a man having the professional status of a Jenner, a Simpson, or a Trousseau, had first announced the doctrine I have propounded, and had exemplified it in practice, it would have been adopted at once; but being brought forward by a man who previously was wholly unknown to the profession, its persistent advocacy is looked on by many as an impertinence which ought to be put down, or laughed at, according to the mood of the observer. And thus it happens that men first scorn that doctrine, then accept it, propitiating the great powers meanwhile by apologies for doing so, and at length claim the merit of being among the first to appreciate and apply it. I am happy to see it already entering on the second and even the third phase.

The last objection which I shall notice, will prove, I fear, in the eyes of the profession, truly formidable. One of the most able and distinguished London physicians recently expressed to me his belief in my neuro-therapeutical doctrines and practice, and then added, "but an almost fatal obstacle to the adoption of that practice consists in the difficulty of instructing patients satisfactorily how to use the spine-bags rightly in each case, and in the large amount of time needful for such instruction. A prescription is quickly written, and a physician who, after examining his patient, writes a pre-

* In a review of my work on "Diarrhœa and Cholera," August 15, 1868.

scription for him in the usual way, may prescribe for a considerable number of patients during the ordinary consulting hours of each day; whereas, if the same physician were to treat his patients by means of spine-bags, so much time is necessarily expended in giving the requisite directions for their use that he would find himself unable to see anything like the same number of patients in a day as he could do when he prescribed medicines only. Now, as the number of patients a consulting physician sees represents the number of fees he receives, the practice of a method which precludes him from seeing as many patients as he otherwise might do, is not likely to commend itself to him as desirable. And depend upon it these reasons will operate powerfully in deterring medical men from advising the use of spine-bags."

That at present this is a weighty objection to them I am constrained to admit. To pronounce on the practice of any method the words "it wont pay," is to condemn it beyond the possibility of redemption, unless it possess intrinsic excellences so vital that even the great destroyer time himself respects and befriends it. Still, my own experience, which, being the largest, gives me the greatest right to be heard on this point, leads me to think that the objection in question is really much less weighty than at first sight appears. I do not find that much time need be consumed in explaining how the spine-bags are to be used, especially as full directions how to prepare them for use and how to adjust them to the whole or to any part of the spine, accompany each bag. I confess, however, that plain and simple as those directions are, patients, either misapprehending or ignoring them, often commit egregious blunders. Nevertheless, I believe that both the difficulties just mentioned will steadily lessen. It must be borne in mind that the idea as well as the practice of treating diseases by means of spine-bags, is only just dawning, that doctors and patients alike are inexperienced in their use, and that the great teacher—custom—will soon enable both to perform their different parts in the application of the method far more easily and expeditiously than is to be expected now. When the objection in question has thus been reduced as far as possible it may, indeed, still have some force in it; if so, and if as therapeutical agents spine-bags are as efficacious as I affirm them to be, that objection will assuredly not remain long unsurmounted. If doctors don't find their way over it patients will find it out for them; and in doing so they would only be doing what the people have had to do, and will

still have to do, over and over again for their professional guides in all directions—the religious, political, legal, and medical being distinguished by their special need to be "educated" by that wise and excellent disciplinarian, Public Opinion.

According to my experience diagnosis is the process which, while always demanding great care, makes an unusually great claim on the time of the physician who treats diseases on the hypothesis here expounded; for, as by that hypothesis, whatever may be the structures in which they occur, they are, as a general rule, or in the majority of cases, symptoms only—the real disorder which they denote being in the nervous system—he cannot know the precise nature and extent of that disorder without first acquainting himself with the state of the organs in each segment of the body; and to do this requires more time than physicians in large practice are wont to give to their patients. And this knowledge of the state of the whole body is necessary to enable him not only to treat successfully the disease about which he is consulted, but also to guard against injuring any part of the organism meanwhile. Indeed it would be impossible to state too emphatically that the treatment of disease through the agency of the nervous system by means of spine-bags cannot be safely conducted as mere routine practice; it must be the result of a thorough understanding of the principles to be applied; of correct observation of, and intelligent reflection on, the whole of the constitutional peculiarities of the patient, as well as the particular disease of which he complains. I have several times been asked by medical men to name the diseases which I think may be treated successfully by spine-bags, and the particular way in which I should apply them in each case; but compliance with this request would do little or no good, and might indirectly do much harm. Suppose, for example, two cases of epilepsy, one associated with a tendency to cerebral plethora, the other with a tendency to cerebral anæmia, and suppose that they were both treated in the same way by means of the spinal ice-bag; one would probably be benefited, but the other would certainly be injured. Again, if a case of epilepsy complicated by the presence of latent tubercle in the lungs were treated in the same way as a case of simple epilepsy might be safely treated, it is probable that that tubercle would soon be developed into dangerous activity, whereas ice *may be* so applied to the spine as to conduce in a remarkable degree to the prolonged quiescence of that morbid deposit. I might, with respect to a vast number of diseases, give like illus-

trations of the above statement, but to do so would swell this pamphlet into a volume, and the proper place for such illustrations would be a systematic work on the applicability of the neuro-therapeutical method in the treatment of the various diseases to which man is liable. Indeed, for the adequate elucidation of this very important subject much experience and careful observation are still needed, and nowhere can these be obtained so advantageously as in a hospital, where at the same time the method in question and its results might be publicly exemplified for the benefit of all desirous of studying it and estimating its worth. But, by a grim fatality, which so often baffles the most untiring efforts of reformers to see their ideas duly realized during their lifetime, I hold no hospital appointment, and, considering how the physicians to our metropolitan hospitals are elected, it is unlikely that I shall ever have the opportunity of demonstrating publicly the principles and practice of the remedial method in question, unless a small hospital is established for that purpose.

In concluding these introductory observations, I beg to thank two rising physicians in Dublin, Drs. Benson and Hewitt, who having so far verified experimentally the accuracy of my views as to become convinced that I have introduced a powerful remedial agent, have had the courage to state their convictions publicly to the Surgical Society of Ireland. I am also equally indebted to Professor Morgan of the same city for publishing the particulars of his successful treatment of a case of "cerebro-spinal inflammation," by means of the spinal ice-bag; to Dr. Townsend of Cork, for publishing a very important case of paraplegia which he has cured by the same method; and to Mr. Hamilton for his report, mentioned at page 38, of his successful treatment of three cases of delirium tremens—also by means of ice. I have reason to know that a considerable number of medical men are now using spine-bags successfully; and if only the natural indolence of mankind did not prevail in preventing them from publishing the results of their experience, the neuro-pathology and neuro-therapeutics in question would be already practically recognised far more generally than they are at present. Authentic facts of cures attested by impartial witnesses are what is wanted in the first place to insure due attention to the method of treating disease through the agency of the nervous system: the theory which originated that method can well afford to wait until facts are accumulated in such abundance as to constrain attention to it.

Section II.

The Physiology of Vomiting.

The present state of our knowledge of the proximate cause and *modus operandi*, or mechanism, of the act of vomiting, is of course the result of the inquiries and experiments of many distinguished men. But for the most satisfactory explanation yet given, both of the muscular actions which conspire to produce vomiting, and of those excito-motor or reflex functions of the nervous system which at once originate and co-ordinate the several movements constituting the process, science is chiefly indebted to the labours and sagacity of Dr. Marshall Hall.*

His explanation is, however, vitiated by one capital error—viz., his assertion that during the act of vomiting the diaphragm is relaxed, "the two cavities (the chest and thorax) being made one by the floating or inert condition" of that muscle. He himself admits that the presence of a considerable amount of air in the lungs is a necessary preliminary to the act of vomiting; indeed he has shown experimentally that if the air be allowed to escape through an opening made in the trachea or in the wall of the chest, the contents of the stomach cannot be ejected. It is, therefore, difficult to understand how this able physiologist came to insist that during vomiting the diaphragm is relaxed—a doctrine inconsistent with the results of his own experiments, and with the observations of many other experimenters, who agree in stating that vomiting is assisted by the simultaneous contraction of the diaphragm, and of the abdominal and thoracic muscles. Apart from his assertion concerning the diaphragm, Dr. Marshall Hall's description of the muscular action which occurs during, or assists in, vomiting, is generally held to be correct by the most recent authoritative writers on the subject, and may be briefly stated as follows:—

1. "The act of vomiting is an effort, not of inspiration, but of expiration." The diaphragm is contracted and "the contents of

* See Section 5, in Chapter II. of his work "On the Diseases and Derangements of the Nervous System."

the thorax and abdomen are subjected to the sudden and almost spasmodic contraction of all the muscles of expiration." . . . .

2. Meanwhile the larynx is firmly closed,—"a fact observed in an actual experiment by M. Magendie, who makes the following observation:—'Dans le vomissement au moment que les matières vomies traversent le pharynx, la glotte se ferme très exactement.'"

3. The cardiac orifice of the stomach is open or in a patulous condition.

4. When the three conditions just named are simultaneously present, vomiting is inevitable. The lungs being filled with air, and expiration being prevented by firm closure of the glottis, the depression of the contracted diaphragm is maintained, not only by the expansion of the lungs themselves, but also by the lateral pressure suddenly made upon them by the powerful contraction of the thoracic muscles; the simultaneous contraction of the diaphragm and of the abdominal and thoracic muscles co-operating with the firmly-distended lungs, exerts a maximum of compressing power on the stomach, and necessarily forces its contents through its open cardiac orifice.

The part performed by the stomach itself in the act of vomiting is still an unsettled question; it has, however, been ascertained that the processes just described are quite adequate to produce vomiting—the stomach being passive meanwhile. Magendie substituted a pig's bladder for the stomach in a living dog, and still vomiting occurred as before; and Dr. Hall concurs with him in affirming that the stomach "has no necessary part in vomiting." "On the other hand," as stated by Dr. Brinton,* "the observations in which a muscular contraction of the stomach has been seen to concur in this act (of vomiting) are even more numerous" than those in which the stomach has been seen to be passive. He therefore concludes: "The abdominal pressure which effects it, often coincides with, and is aided by a contraction of the muscular coat of the stomach itself. But there is no sufficient reason for supposing that an antiperistalsis ever obtains, far less for imagining that it constitutes a special element of this expulsive process." I have arrived at the conclusion that when the disposition to vomit occurs in cases where the stomach is healthy, that disposition is first felt in the stomach itself; that the effort to expel its contents is first made by its own muscular

* In his admirable article on the *Stomach and Intestines*, published in the Supplement to Todd's "Cyclopædia."

contractions; that these not sufficing, the abdominal and thoracic muscles are called into play; and that as the tendency to vomit declines, the extrinsic or abdominal and thoracic muscles become passive first, and the intrinsic or muscular fibres of the stomach last. This opinion is founded upon numerous observations of persons vomiting—observations which in the course of my study of the physiology of sickness, and especially of sea-sickness, I have had frequent opportunities of making. It is obvious that the less muscular straining there is coincident with the act of vomiting, the less distressing the act will be; and that if it were effected simply by the contractions of the stomach itself, the distress accompanying it would be proportionately small. In cases in which the co-operation of the voluntary muscles in the act of defæcation is either painful or attended with danger, these muscles are kept quiescent, and the patient waits until the expulsive force of the intestine opens the sphincter ani and empties itself. As the maximum of ease during the act is thus secured, by restricting its performance to the involuntary muscles, so, in the act of vomiting, when patients say the contents of the stomach come up quite easily, their statements physiologically interpreted mean, I believe, that the process is effected by a minimum of voluntary and a maximum of involuntary muscular action. Whether the muscles of the stomach and intestines are governed by nervous centres forming a part of the spinal cord or of the great sympathetic, certain it is that during vomiting the first effect of the sedative influence of ice applied along the spine, is that of restraining the actions of the thoracic and abdominal muscles, and thus of restricting more or less completely the process of vomiting to the muscular coat of the stomach itself. When this is accomplished, it is astonishing with how little inconvenience or discomfort to the patient vomiting is effected: he, or she, will probably observe (the remark has often been made to me) that the contents of the stomach come up of themselves. By persisting in the use of the ice, after the walls of the thoracic and abdominal cavities have been rendered quiescent in so far as vomiting is concerned, the contractile coat of the stomach itself is at length released from undue nervous stimulus, and with its relaxation vomiting, or the tendency to vomit, ceases.

The question,—What constitutes the nervous agency by which vomiting is induced? is very difficult to answer. Dr. Marshall Hall thought the answer very easy: assuming the medulla oblongata as the "centric organ of expiratory effort," he states that

the excitor nerves, irritation of which produces vomiting, are the Faucial branch of the Trifacial; the Gastric, Renal, and Hepatic branches of the Pneumogastric, and the Intestinal or Uterine branches of the spinal nerves. The corresponding motor nerves by which the impulses originated in the medulla oblongata by the excitors are conveyed to the expiratory muscles concerned in the act of vomiting are, as he says, "the spinal nerves distributed to the intercostal and to the abdominal muscles." The part played by the pneumogastric as an excitor of vomiting, is by no means so clear in fact as it appeared to Dr. Marshall Hall. The remarkable experiments of Dr. John Reid prove conclusively that after the vagi have been completely severed, all communication by them between the stomach and medulla oblongata being thus rendered impossible, the stomach is far more excitable than before: during several days after the operation it ejects whatever food is put into it, almost as soon as it is taken. The same experiment, several times repeated on different dogs, was in each case followed by the same result.* From this the conclusion is inevitable that the stomach can be excited to vomiting by substances within itself, independently of the pneumogastric, and that though this nerve may perform the function of an excitor, one at least of its most important functions is an inhibitory one—viz., that of so controlling the stomach during digestion as to restrain it from ejecting its contents. It is remarkable that though Dr. Reid published the results of his experiments in 1839, Dr. Marshall Hall takes no notice of them in the section on vomiting contained in his work on Diseases and Derangements of the Nervous System, published in 1841.

* In Die Zeitschrift für rationelle Medicin, herausgegeben von Henle und Pfeufer, vol. xvi. p. 432-3-4, is a report of Experiments, consisting in division of the Vagi, by Ravitsch and Schiff:—

"*Ravitsch* fütterte je zwei Hunde, zwei Frösche mit der gleichen Speise durchschnitt dann bei einem der Thiere beide Vagi am Halse und untersuchte nach 24 Stunden die Mägen. Bei den gesunden Thieren war der Magen fast oder ganz leer, bei den operirten fand sich Alles oder der grösste Theil des Eingebrachten noch in Magen vor."

"*Schiff* leugnet, gestützt auch auf neue Versuche mit Benutzung von Darmfisteln dass nach der Durchschneidung der Vagi bei Hunden, welche *Schiff* unter dem Zwerchfell resecirt, keine Speisen mehr aus dem Magen in dem Darm befördert würden; der Magen entleere sich nach der Vaguslähmung, und zwar nicht durch den Reiz der Nahrungsaufnahme dazu veranlasst in dem Sinne, wie es *Ravitsch* für Herbivoren annimmt. Magen-bewegungen erhielt *Schiff* auch vom Sympathicus aus; der Vagus sei also nicht der einzige motorische Nerv des Magens, wie R. wollte."

Dr. Reid's experimental results are in striking accordance with the conclusion to which I have been led, and the accuracy of which has been confirmed by a large experience in the medical treatment of various kinds of sickness—viz., that in the majority of cases the reflecting centre from which motor impulses productive of vomiting are transmitted to the stomach, is not the medulla oblongata, but the spinal cord. Cerebral disorders, and notably affections of the medulla oblongata, are often undoubtedly associated with vomiting; but it seems to me that the function of the encephalic centres in relation to the stomach, is chiefly one of control or co-ordination of the agents more immediately concerned in carrying on its wondrous processes; while those agents themselves consist of certain ganglia of the sympathetic, and of nerve-cells forming part of the grey-matter of various segments of the spinal cord. When the brain is disordered, the disorder is commonly propagated to the so-called automatic nervous centres presiding over the nutrition and other organic functions of each segment of the body: but if such disorder expresses itself, *inter alia*, in tonic spasms of the arteries nourishing the bowels or the extremities, causing in the one case constipation, and in the other obstinate coldness of the limbs, we do not therefore deny that the arteries in question are governed by the ganglionic nervous centres related to them, and immediately affirm, on the contrary, that without the intervention of subordinate agents their diameters are directly regulated by the brain. It is well known that the bulging of the spinal cord where the nerves are given off to the upper and lower extremities, corresponds to an amount of vesicular matter or reflecting cells far greater at those parts than exists in any other segments of the cord, and that these cells preside automatically over the actions of the limbs, which therefore do their work, as in standing or walking for example, with a very slight degree of superintendence from the brain. That superintendence is, however, essential. But because it is so we do not refuse to recognise in the spinal centres in question the proximate causes of those muscular actions constituting standing and locomotion. These cases are, in my opinion, exactly analogous with that under consideration; and the more closely the facts in question are scrutinized, the more completely this opinion will, I believe, be justified. Dr. Reid has demonstrated that in cases where no irritations productive of vomiting are reflected on to the stomach from the brain, intestines, or pelvic viscera, and when, according to Dr. Marshall Hall, the sole excitors of vomiting pro-

ceeding from the stomach itself—viz., the vagi, have been completely severed, vehement excitations nevertheless proceed from the stomach, and induce vomiting so long as the stomach has anything to eject. It is clear that the chief, if not only path of these excitations is along the splanchnic nerves to the spinal cord. On the other hand, Dr. Marshall Hall's statement that the motor nerves which combine to produce the act of vomiting are chiefly spinal nerves, is not generally accepted by physiologists. Dr. Brinton regards "the medulla oblongata as that segment of the cerebro-spinal centre in which the reflection towards the periphery occurs." I am disposed to believe that no impulses productive of vomiting reach the stomach along the path of the pneumogastric nerves, and that the only motor nerves concerned in the act, and proceeding from the medulla oblongata, are those effecting the closure of the glottis. As already stated, vomiting takes place more freely when the connexion between that centre and the stomach by means of the pneumogastric nerves is destroyed, and it is generally admitted that when the glottis is closed vomiting may be induced by contraction of the diaphragm and of the thoracic and abdominal muscles. Now, inasmuch as all these muscles are innervated from the spinal cord, it seems clear that the act of vomiting is produced by impulses emanating chiefly, at all events, from the spinal cord. If so, the chief question remaining for determination is whether the afferent and efferent nerves concerned in vomiting, and which are obviously spinal, are mainly related to spinal centres which at once receive the impressions and originate the motions productive of vomiting? It may be, of course, that through the agency of the cord those impressions are conveyed to the medulla oblongata, and that the motor mandates are conveyed back along the same track; but the facts which I have ascertained strongly countenance, if they do not fully justify the belief that this question must be answered in the affirmative; and whatever may be the exact truth of the matter, they prove conclusively that, for all practical or therapeutical purposes, the doctrine that the proximate cause of vomiting has its seat in the spinal cord may be safely assumed as true.

In cases of vomiting where there is no organic disease, as in sea-sickness, for example, if the reflecting centre whence motor impulses proceeding to the stomach and causing vomiting be the medulla oblongata, then it is obvious that our best chances of allaying the vomiting consist in lessening the reflex activity of the

medulla oblongata by applying cold at once to the uppermost part of the spine, and across the base of the head from ear to ear; as a matter of fact, however, ice thus applied is generally inefficacious, not seldom worse than useless, and sometimes actually increases instead of stopping the vomiting. But if in these cases ice be applied along the whole spine, and especially along the lower half of it, the vomiting will be arrested.

These results certainly seem to warrant the conclusion that the nervous centres which operate as the *proximate* cause of vomiting are not encephalic, but spinal. It may be said that ice applied along the spine arrests vomiting not by virtue of its sedative influence on any spinal centres which act as the proximate cause of vomiting, but by benumbing those conducting fibres of the cord which are intermediate between the spinal nerves concerned in vomiting and the medulla oblongata, and thus by lessening the frequency and force of the impressions made upon it and the impulses transmitted from it, disqualifies it for that energetic action on which vomiting depends. But if this were so, ice to the nape of the neck and across the occiput should prove far more efficacious than if applied elsewhere, because while exerting its maximum of depressing force on the conducting fibres in question, it is at the same time sufficiently near the medulla oblongata to depress it to some extent also. If, on the contrary, the function of the medulla oblongata in respect to vomiting be an inhibitory and controlling one through the medium of the vagi, while the immediate nervous agents of the process exist in the spinal cord, it is easy to understand how it comes to pass that ice along the cord will restrain vomiting, and that if applied to the nape of the neck and across the occiput, it not only fails to do so, but sometimes increases it.

Section III.

*The Physiology of Sea-Sickness.**

The *proximate* cause of the remarkable and often terrible malady —sea-sickness, has excited endless discussion, but has still remained involved in great obscurity. Several sagacious conjectures have, however, been hazarded concerning its nature, some of them, as I believe myself able to prove, coming very near the truth. The doctrine of the excito-motor or reflex functions of the spinal cord is, as shown in the preceding Section, a guide to the whole physiology of sickness, and following it, I was led to predict how to prevent, arrest, or control, not only sea-sickness, but, also, how to remedy or palliate every kind of sickness, whatever may be its *primary* cause.

I hold that the *proximate* cause of sea-sickness consists in an undue amount of blood in the nervous centres along the back, and especially in those segments of the spinal cord related to the stomach and the muscles concerned in vomiting. This condition is induced by the movement of the vessel in, I believe, three ways :—1st, through the brain; 2nd, through the ligaments of the spinal cord; 3rd, through the abdominal and pelvic viscera.

If, by one or several causes, the amount of blood circulating in the spinal cord be increased considerably beyond the normal amount, all the nerves emanating from it partake of the increased activity of the cord itself, and convey from the centre to the periphery of the nervous system an abnormally large number of exciting impulses. Those parts of the body which are subject to the will—the purely voluntary muscles—resist these impulses most easily; and only in extreme cases, therefore, are their ordidinary functions deranged; but the involuntary or purely organic functions, being unsustained by cerebral influence under the direction of a dominating will, have their usually regular and tranquil life easily disturbed and thrown into confusion by the unwonted number of exciting impulses transmitted to them from the preternaturally excited spinal cord.

* This and the following Section are reprinted from *The Medical Times and Gazette* of September 3rd and 10th, 1864.

Cerebral Movements a Source of Sea-Sickness.—In those cases in which the brain is the principal or first seat of disturbance, it is probable that this organ is protected from concussion against the walls, and especially against the base, of the skull by a less than the normal amount of the cerebro-spinal fluid; or that the brain in such cases is so peculiarly susceptible to shocks as to become abnormally excited by concussions too slight to be felt or to produce inconvenience in really healthy persons. The cerebral circulation may also be especially liable to derangement—the arteries unduly contracting or dilating in response to influences which would exert no sensible effect in the other classes of sufferers from sea-sickness. So great is the difference in the amount of blood circulating in the brain at different times, that it swells up and contracts again to an astonishing extent, in correspondence with its varying degrees of activity or of repose: observations of the living brain in man and animals, in cases where portions of the skull have been removed, prove that the cerebral expansion during wakefulness, and still more during mental excitement, is remarkably great—vessels previously invisible suddenly swelling to appreciable diameters, and those already discernible becoming notably larger; and conversely, that during tranquil, and still more during dreamless, sleep, the cerebral contraction is simultaneously great, so that the brain occupies a much less space than before. If the brain can thus enlarge and diminish within its bony case in proportion to the amount of blood circulating in it, it is evidently capable of movement by violent impulses from without to an extent sufficient to induce great cerebral irritation, and at the same time to contribute to the motion of the spinal cord, and thus to irritate it through the jerks on the ligamentum denticulatum in the manner about to be suggested. When a person is in an upright position in a pitching vessel, the brain, being a soft substance, alters its form with every rise and fall of the ship. At the moment when the upward movement is arrested the brain continues to tend in the same direction, and as the downward movement begins, presses towards the roof of the skull; and then again, when the downward movement is arrested, the brain continues, as before, to tend in the same direction, and as the upward movement recommences, presses towards the base of the skull. In this manner the brain tends to expand in its lateral diameter, and to contract or become slightly flattened in its vertical one, and therefore to pull, in some slight degree, the

cord upwards and again to press it downwards, thus acting as a co-operative cause of the vertical movement of the cord within its fibrous sheath.

In some sufferers from sea-sickness, headache peculiarly intense, with cerebral hyperæmia, is one of the most striking symptoms. In these cases of undue cerebral sensitiveness, exciting impressions are transmitted from the brain to the medulla oblongata, and thence forward to the whole spinal cord; these impressions, acting as irritants, increase the flow of blood to the whole spinal axis, and consequently, its functional activity; the nerves emanating from it, and conveying its impulses, directly or indirectly, to the stomach and other abdominal viscera, excite them to preternatural action; when that action exceeds certain limits, the thoracic and abdominal muscles also become active, either simultaneously and directly, or secondarily and indirectly—through the medium of impressions propagated from the excited stomach to the spinal cord, and from it reflected to them; thus sea-sickness, in its various grades of nausea, retching, vomiting, may originate in cerebral disturbance, the stomach being unduly excited through the intervention of the spinal cord and the collateral ganglia of the sympathetic.

Spinal Movements a Source of Sea-Sickness.—As the spinal cord is suspended in a fibrous tube by means of a series of lateral ligaments, and is surrounded by water—the cerebro-spinal fluid—by which it is saved from concussion, it is probable that each time the body, when in a standing or sitting posture, is rapidly raised or depressed by the alternate rise and fall of the vessel, there is a slight jerk on each of the ligaments holding the spinal cord in its place. If we suppose a person to be sitting in the middle of a compartment of a railway carriage, and to be tied in his place by four cords passing from him to the four corners of the compartment, and then that the carriage be suddenly moved, the tendency of the body to remain stationary will cause a jerk on two of the cords, the jerk being felt, of course, at the points where the cords are tied on the person. On the same principle and in the same manner, the movements of the vessel cause jerks on the inner sheath of the spinal cord along the line of origin of the spinal ligaments, called collectively the *ligamentum denticulatum*. These jerks produce irritation, and consequent afflux of blood, and as in cases when the outer cerebral membrane, the dura mater, is inflamed or irritated, the

abnormal condition affects the brain also, so, *à fortiori*, if the inner sheath of the spinal cord—the pia mater, with which the ligamentum denticulatum is homogeneous—becomes the seat of undue vascularity, the spinal cord itself will be likewise affected. It has already been suggested that the movement of the brain itself and its consequent slight changes of form are likely to cause some alternate tension and slackening of the spinal ligaments; but as the substance of the cord is soft, like that of the brain, it is liable throughout nearly its whole length to a certain amount of derangement by the alternate rise and fall of the vessel, on the same principle and in the same manner as the brain itself, even though each end of it were immovably fixed; and thus it is difficult to avoid the conviction that the cord is always subject to slight jerks along the line of origin of the ligamentum denticulatum, partly in consequence of its connexion with the brain, moving as described, and partly in consequence of the movements directly imparted to it by the pitching vessel. Violent pitching movements may thus increase the circulation of the whole cord in persons who maintain an upright position, and indirectly, through it, the circulation of the proximate sympathetic nervous centres; it is easily conceivable that in this manner those segments of the cord related to the stomach (directly or indirectly) and to the muscles concerned in vomiting, will transmit their impulses to these organs in such an abnormal degree as to induce sickness in all its grades. Assuming that sea-sickness is sometimes induced in this way, it is probable that it is so in those persons in whom the spinal cord, as well as the dorsal ganglia of the sympathetic, is already in an abnormal or peculiarly sensitive condition. In persons who believe themselves healthy there is a remarkable difference in the degrees of tenderness observable when pressure is made along the different parts of the spine; and perhaps further investigation will prove that persons in whom preternatural tenderness is detected are peculiarly liable to sea-sickness.

Visceral Movements a Source of Sea-Sickness.—The third process by which an abnormal amount of blood is induced in the nervous centres along the back consists in the excessive movements of the viscera within the abdominal and pelvic cavities; indeed, the weight of the heart is such as to justify the belief that this part of the contents of the thoracic cavity is also impelled at least upwards and downwards with pre-

ternatural force by the motion of the ship, and in this way helps to disturb the regular action of the diaphragm to which it is attached, and which, in consequence of the excessive movements of the abdominal viscera, is subject to more than the normal pressure which they make upon it. As the body is moved upwards and downwards and from side to side with the vessel, the solid and hollow viscera are more or less violently shaken and brought into concussion with each other. In proportion to the amount of contents of the hollow viscera will be the impetus of their movements, and the consequent force of the shocks against each other and the abdominal walls which they experience.* These movements and shocks, and the irritation caused by the continually changing positions of the contents of the hollow viscera, produce an abundance of abnormal impressions upon the nerves distributed to the various organs; these impressions are conveyed through the medium of the complex visceral nerves and the sympathetic ganglia to the spinal cord, which they influence in the manner already described, thus inducing in it an excessive reflex activity, and hence the transmission of a preternatural amount of motor force to the stomach and bowels, and indeed to all the viscera, as well as to the thoracic and abdominal muscles. Sea-sickness, and the diarrhœa which not unfrequently accompanies it, are in this manner easily accounted for—so easily, in fact, that the process last described will probably be held by many pathologists to be the chief, if not the sole proximate cause of the malady. The fact that it is induced in this way accounts for the partial relief which sufferers sometimes obtain by the application of tight bandages round the abdomen, as they obviously lessen the visceral movements. Assuming that the several movements of the brain, the spinal cord, and the viscera contribute to cause sea-sickness in the manner now explained, it is easy to understand why it is that persons are most liable to become sick when in an upright position, seeing that that position permits of a more extensive movement of the brain, of the spinal cord, and of the viscera within the abdominal cavity, than is possible when the patient is lying down.

Those of my readers who regard the pneumogastric nerves as the sole media of motor power over the stomach will probably

* A gentleman has recently informed me that his wife when at sea during pregnancy suffers much more from sea-sickness than she does when at sea at other times. This increase may be due in part to the cause suggested in the text, but it is doubtless also due to the physiological excitation transmitted from the enlarging womb to the nervous centres which preside over it.

object to the theory of sea-sickness last given, that there is no anatomical evidence of the relationship which I have alleged to exist between the spinal cord and stomach, together with the bowels; that, with the exception of the *par vagum*, the nerves distributed to those organs are derived from the ganglia of the Sympathetic, that no spinal nerves are found to ramify upon them; and that therefore the idea of afferent nerves conveying impressions from the stomach and bowels to the spinal cord, and of efferent nerves conveying motor force from the cord to the stomach and intestines, is a pure assumption. It may be as well to remind such objectors that many facts of animal structure which the anatomist has failed to discover have been revealed to the physiologist; that numerous vivi-sectional experiments by various investigators go far to establish the relation which I have assumed to exist between the spinal cord and alimentary canal; and that my own therapeutical experiments confirm their conclusions in a very remarkable and decisive manner. Moreover, it is well known that the communicating branches between the spinal cord and the ganglia of the Sympathetic consist of fibres from the cord to those ganglia, as well as of fibres from the ganglia to the cord. Such being the case, we are enabled to understand how these spinal fibres, blending with the sympathetic fibres, may enter into the complex structure of those nervous centres presiding over the functions of the abdominal viscera, although not traceable and demonstrable by the anatomist. And as physiological evidence, derived from dividing in the living animal the communicating branches between the two nervous systems, and observing the results, as well as the evidence I am about to tender, proves that the stomach and bowels may be acted upon through the spinal cord without the intervention of the pneumogastric nerves, we are, indeed, forced to the conclusion that the lines of communication along which the nervous influence passes must be as follows:—Impressions made on the stomach, and having reference to its functions, are carried by the fibres converging from that organ to the solar plexus, are thence transmitted up the splanchnic nerves to the thoracic ganglia on each side of the spinal cord, and from thence are continued onwards, through the *rami communicantes*, to the cord itself; coming to the cord with preternatural rapidity and energy, they irritate it unduly, increase the quantity of blood in it, and thus induce in it a condition of excessive excitability: its functional power becoming greatly intensified, it reflects, in the form of motor im-

pulses, on the stomach and other co-ordinated organs the impressions made upon it. The impulses transmitted to the stomach itself pass along the same line as the impressions from it, only in the reverse direction—viz., from the cord to the thoracic ganglia, thence by the splanchnic nerves to the solar plexus, and through it to the stomach; but the muscles which co-operate in vomiting receive their mandates of course through the more direct line of the spinal nerves themselves. The bowels tell of the disturbances to which they are subject to the superior and inferior mesenteric plexuses, these transmit the complaint to the vertebral ganglia of the Sympathetic, and they forward it, along the *rami communicantes,* to the spinal cord, which, if thus excited to a considerable degree, sends unusually energetic motor currents in the reverse direction to the circular muscles along the complaining organs; hence these muscles contract with excessive vigour, and co-operating with the preternaturally active mucous membrane and other secreting organs along the alimentary canal, induce diarrhœa.

The physiological light thrown upon the relation between the nervous centres along the back and the stomach and bowels by the application of cold and heat to the spinal region is indeed great, and for therapeutical purposes not less important. I can state from experience that a large proportion of cases of chronic constipation and the great majority of cases of diarrhœa can be remedied by modifying the temperature of the back. The subject is, however, more complex than it seems at first sight, and cannot be discussed here *in extenso;* but I may just say that, for good physiological reasons, ice to the back is capable both of overcoming constipation and stopping diarrhœa, and that while heat, which applied to healthy persons tends to impede the functions of the bowels, and which in some cases would restrain diarrhœa, would in other cases—as, for instance, when it accompanies sea-sickness—contribute to its continuance. Moreover, I have demonstrated by experiments, as well as by arguments, that the proximate cause of the diarrhœa so common everywhere in hot weather is the same as the proximate cause of the diarrhœa which sometimes accompanies sea-sickness—viz., an undue amount of blood in the mesenteric plexuses and in certain nervous centres along the back. In the one case the ultimate cause of this preternatural sanguineous afflux is the motion of the ship; in the other it is, if I am right, the heat of the sun which, either directly raises the temperature of the nervous centres along the back, or, indirectly, by modifying to an extreme degree the electric condition of the

atmosphere, exerts a morbidly exciting influence upon them through its agency.

In the first edition of this pamphlet I suggested the existence of an analogy between sea-sickness and cholera, and predicted that the latter would also be "both averted and cured by ice applied along the back." Further study deepens my conviction of the existence of that analogy. Sea-sickness "is very often preceded by vertigo, and sometimes by headache. In some individuals there is a feeling of uneasiness, sinking, and great distress at the epigastrium, which is described as worse than vomiting, and which occasionally lasts for a long time. Sickness of the stomach and vomiting, however, in general, soon come on. The vomiting is frequent and exceedingly distressing, with convulsive heaving of the stomach, which extorts groans from the patient. Along with this is a general feeling of wretchedness and prostration, which, in bad cases, is sometimes so great as to render the patient utterly inattentive to everything around him, and almost indifferent to life."* The writer of this description certainly had no idea of any analogy between sea-sickness and cholera; yet, if only diarrhœa were added to it, it would serve very fairly to characterize the onset of cholera. "But," as I have already observed in my work on *Diarrhœa and Cholera*, "if the symptoms of sea-sickness had been more fully described, the uncommon, as well as the common being included, the likeness would have been still more obvious. The surface of the body becomes pale and cold; there is generally profuse cold sweat, and not unfrequently diarrhœa, sometimes cramps, sometimes, though more rarely, muscular rigidity, and occasionally convulsions. Diarrhœa and cramps are, however, much more frequent accompaniments than seems to be generally supposed. Persons who speak of having been sea-sick scarcely ever mention the former, but if a number be questioned on the point, it is almost certain that some of them will confess to having been troubled simultaneously with diarrhœa. When sea-sickness ends in death, as is sometimes the case, it generally does so through extreme exhaustion, consequent on the prolonged vomiting, and general impairment of nutrition. Every feature of the disease is also a feature of cholera, and it differs from cholera chiefly in the facts that diarrhœa is a subordinate instead of a prominent symptom; that all the symptoms, except vomiting, are less severe than are those of cholera; that it is rarely fatal; and

* "Treatise on the Practice of Medicine." By G. B. Wood. Vol. i. p. 562.

that, whereas it is always produced by motion, heat and many other influences, as well as motion, originate cholera."

What may be the relative amounts of the several shares contributed by the three chief processes now described in causing that preternatural afflux of blood in the spinal cord on which sea-sickness depends, is a question extremely difficult, and probably impossible to determine. There can be no doubt, however, I apprehend, but that in one person the brain, in another the spinal cord, is primarily responsible; that in a third, the abdominal viscera play the chief part; that each is always concurrent in some degree; that all ultimately produce the same result; and that, until the irritation of one or all the kinds described be continued sufficiently long to produce a preternaturally large amount of blood in those segments of the spinal cord related to the stomach, vomiting is impossible. An interesting confirmation of the doctrine here expounded consists in the fact that sickness may be induced by heat applied to the back. It is well known that many persons cannot stand with the back to the fire without feeling nausea. In some cases of paralysis in which I have ordered friction to the spine, the friction—by evolving heat, I presume—caused sickness, and therefore could not be persisted in; and in a case of pulmonary hæmorrhage, in which, as I am in the habit of doing in other cases, I prescribed a double column of heat along the dorsal region, the remedy cannot be adequately used with impunity, because though it stops the hæmorrhage and accompanying pulmonary congestion, it invariably induces sickness. If a short double column of heat be applied to the cervical region only of this patient he becomes sick.*

* It is right to observe that this patient has been peculiarly liable to sickness since infancy. His experience is a remarkable confirmation of the truth of the therapeutical doctrines which I have announced, and a not less remarkable, but happily rare, illustration of the difficulty of applying those doctrines in certain cases. If, in order to stop his sickness, cold be applied to his spine, even in the lumbar region, and for a short time only, it induces unpleasant sensations in the chest, and would no doubt soon cause hæmorrhage; while conversely, as already said, if in order to stop pulmonary hæmorrhage heat be applied, he immediately becomes sick. Notwithstanding the sickness, however, he says he shall still use the hot-water bag when either attacked or threatened with spitting of blood. He volunteers an interesting observation concerning the sickness induced in him by the hot-water bag. He says that, whereas when sick spontaneously the sickness is sometimes accompanied with considerable muscular effort, and is always followed by a headache, the sickness caused by the hot-water bag is always without muscular effort, and is never followed by headache. Indeed, if he has a headache at the time of applying the heat, the heat takes it away.

Besides the phenomena of sea-sickness already adverted to, there are others which, though arresting the observer's attention less forcibly, and though less distressing, are not less interesting to the physiologist and physician—viz., the deadly pallor, the cold sweat, physical weakness, headache, and mental prostration and indifference, which in degrees varying from a condition of mere *malaise* to one of such vital depression as to imperil life itself, form a part of the malady. The pallor, coldness of the surface, and loss of strength, both physical and mental, are all expressions of one and the same fact, and denote that an inadequate supply of blood is passing through the capillaries all over the body. This diminution and partial arrest of the peripheral circulation involve impairment of the nourishing and oxygenating processes throughout the body; and as animal heat is a result of the chemical changes constituting a chief part of those processes, the temperature necessarily falls when their activity is lessened. The skin as the blood retires from it becomes pallid, the muscles, supplied less copiously than before, become feeble, and the brain having its sanguineous supplies so far cut off that the forehead generally becomes strikingly cold, is rendered incapable of either vigorous thought or feeling, and in extreme cases, patients evince utter indifference, both intellectual and emotional, respecting persons and events around them.

Now if, as alleged, these phenomena are due to a diminution of the blood-currents in the small arteries, and in the capillaries in nearly all parts of the body, the problem for solution is—How is this diminution produced? It is through the agency of the sympathetic nervous system, the orderly action of which is deranged by the ship's movements in the manner now to be described.

As the cerebro-spinal nervous centres are the organs of those excito-motor or reflex functions chiefly concerned in carrying on the relations of the organism with the outer world, so the sympathetic or ganglionic nervous centres are the organs of those excito-motor or reflex functions chiefly concerned in ministering to the life, growth, and renovation of the organism itself, and by which its several parts are supplied with material for the elaboration of their respective contributions to the totality constituting the living being. The most important office of the sympathetic nervous system is that of presiding over and controlling the circulation of the blood: afferent and efferent "organic" nerves ramifying over the arteries, as ivy

round a tree, and connected centrally with the sympathetic ganglia, are the media by which the circulatory is subordinated to the nervous system. As the sensory or afferent nerve-fibres of the cerebro-spinal system, which pass from the viscera, convey their impressions to the spinal cord, and in cases of sea-sickness produce the physiological conditions already described, so the afferent nerves of the sympathetic system receiving impressions in unusual numbers and of unusual intensity from the brain and abdominal viscera, convey them to the ganglionic nervous centres, which reflect them through the ganglionic efferent nerves in the form of impulses or orders transmitted to the arteries, and producing their contraction. Hence the nerves fulfilling these offices are called *vaso-motor* nerves. In order to understand the part they play in sea-sickness, it is necessary to bear in mind that when an impression has been made upon the afferent nerves of an artery, that impression will not necessarily cause motor force to be reflected to that artery, at least not to that alone, but may cause the contraction of arteries far away from it: for example, impressions, as of cold, made on one limb will be reflected on the opposite limb, thus inducing its arteries to contract also; impressions made on the uterine nerves will cause contractions of the arteries of the lower extremities, and *vice versâ;* again, abnormal impressions transmitted from the uterine nerves may be reflected on to the bowels and cause constipation. It may therefore be stated as a general truth capable of a wide application, that the limbs of the nervous arcs constituted by the centripetal and centrifugal nerves, and intervening central ganglia of the sympathetic nervous system, are often very widely spread, and thus, indeed, justify the name "sympathetic," by which that system is mostly designated. Moreover, as all the ganglia of the sympathetic system are intimately connected by inter-communicating fibres, a particular condition of hyperæmia or anæmia induced in one is soon propagated to those in immediate relation with it, and indirectly through them, though in lessened intensity, to those at successively increasing distances from it. A knowledge of these facts will greatly facilitate the understanding of the causal relation of the phenomena of sea-sickness now in question.

A ship's motions cause in the persons on board movements of the brain and of the contents of the abdomen and pelvis, as already explained. The abnormal impressions made on the various organs by these movements, and by the various shocks to which they are severally and in varying degrees subject, are received

not only by the sensory nerves, as already explained, but also by the afferent vasic nerves of each organ subject to disturbance. These vasic nerves continue the impressions to the ganglia, and produce there such preternatural activity or irritation as to cause an unusual afflux of blood in them; their functional energy is therefore proportionally increased, and consequently, they transmit their motor influence in unusually full and rapid streams to all the blood-vessels to which they are related. The muscular coats of these vessels thus stimulated contract; a large proportion of the blood previously circulating in the parts to which the vessels in question are distributed is shut off, and hence the diminution of the capillary circulation, and of all those processes involving nutrition, oxygenation, textural transformation, and the evolution of heat, on which the continuance of healthy vigorous life depends.

The intimate relation between the bowels and the skin is very remarkable, and has long been the subject of special observation. It is painfully illustrated in cases of those extensive burns which cause death. The amount of injury sustained by the skin itself often extends over so limited an area as to present no adequate reason why death should ensue, and, indeed, is proved not to be its proximate cause—the post-mortem examination revealing internal inflammation or disease either of the brain or of the thoracic or abdominal viscera, which really destroyed the patient. The alimentary canal is peculiarly liable to be thus affected. In such cases the vehemently excited nerves distributed over the injured skin transmit their preternaturally intense impressions to the nervous centres into which they converge, and these, thus unduly excited, reflect them not only to the skin, but in various other directions, and especially on the mucous membrane of the bowels.* It will be readily understood that, if such is the intimate relation between the bowels and the skin, impressions made on any part of the alimentary canal may be reflected from it through the vaso-motor nerves, ramifying over the arteries of the skin, thus causing their contraction, diminishing the amount of

* I venture to predict that the lives of many persons imperilled by burns, in the manner described in the text, will hereafter be saved by the arrest of the excessive reflex activity of the nervous centres along the back by means of ice. I have not yet had an opportunity of testing this method in respect to burns, and therefore commend it especially to those physicians who are in the neighbourhood of ironworks and other factories where burns are frequent. If experience shall confirm the accuracy of this prediction, the first physician who shall verify it will contribute to introduce a method of treatment which will greatly alleviate human suffering.

blood in them and the transformative processes depending on its presence, and consequently the heat of the whole surface of the body. The remarkable pallor so frequent in sea-sickness is, of course, only a part of this result. The voluntary muscles, having their capillary circulation diminished in the same manner, have their functional power, of course, correspondingly enfeebled. The contraction of the cerebral arteries may be partly induced by motor impulses, which had their origin in impressions conveyed from the viscera to the thoracic ganglia, and producing irritations there which are propagated upwards through the cervical ganglia in the manner already explained; but it is probable that those contractions are chiefly due to irritating impressions made on the afferent nerves of the cerebral arteries and originating in cerebral disturbances caused by the ship's movements. Whatever may be the primary source of the motor influences causing the contractions of these arteries, the pathological result is the same, viz., diminution of the cerebral circulation, impaired cerebral nutrition and function, and that remarkable form of headache resulting from a deficient supply of blood and distinguished by an especial coldness of the forehead. This condition of the cerebral circulation fully accounts for that extreme mental prostration and indifference to all surrounding objects which is such a remarkable feature in cases of extreme sea-sickness. In some cases, however, the cerebral circulation is not thus affected, and usually during the act of vomiting the amount of blood in the head and face is temporarily increased by muscular pressure on the jugular veins and by the disturbance of respiration.

In the Introduction I have given a brief outline of the physiology of perspiration, and have shown that it is identical with that of the secretion of mucus. I have also shown that the sweat glands are supplied with nerves from the cerebro-spinal axis, and that though they may be stimulated into extreme activity by external heat—as, for example, a tropical atmosphere or a Turkish bath—their functions are essentially under the control of the spinal centres, which, if anæmic, will permit the sweat glands to remain inactive, but which, if hyperæmic, will force them to elaborate and exude sweat, even though the surrounding temperature be very low, and the skin generally anæmic. These demonstrations afford a complete explanation of the immediate cause of the profuse and often cold sweating of sea-sickness, as indeed of nearly all sickness, while the fact itself is an additional and most convincing proof of the presence of an excessive amount of blood in the spinal cord.

Section IV.

The Prevention and Cure of Sea-Sickness by means of the Soinal Ice-Bag.

The inevitable conclusion from all the facts and arguments of the preceding exposition is that the only scientific and really effective remedy for sea-sickness must be one which has the power of lessening the amount of blood in the whole nervous centres along the back. This, as I have proved, can be effectually done by lowering the temperature of the spinal region by the application of ice. A formidable-looking remedy, I admit; but when it is judged of by the aid of experience it ceases to terrify, and, on the contrary, is found decidedly agreeable. Ice applied in bladders or by any of the ordinary methods would undoubtedly occasion great discomfort, would constrain the movements of the patient, compelling him to remain for the most part in one position, and, in fact, could not be so applied as to insure success. It is necessary, *first*, that the ice be kept in contact with each region of the spine, the upper portion of the ice being prevented from falling down as the melting proceeds; *secondly*, that the application do not extend far on each side of the spinal cord, otherwise the patient will become cold; *thirdly*, that, having regard to the comfort of the patient, the mouth of the bag containing the ice be so effectually closed as to prevent the water from escaping as the ice melts; *fourthly*, that the mouth of the bag be as wide as the bag itself, in order that the bag may be easily and rapidly filled; and, *fifthly*, that, without any inconvenience to the patient, facility should be afforded for giving escape to the air which accumulates in each compartment of the bag as the ice melts.

After long consideration and many experiments I have succeeded in perfecting a bag which fulfils all the above requirements. It is made of india-rubber, and consists of several compartments —generally three. These compartments are separated from each other either by intervening brass clamps applied externally, or by internal india-rubber septa of different lengths. In all cases the mouth of the bag is closed by a clamp, one side of which is so thin as when turned next the back to cause no inconvenience to the wearer of the bag, while the action of the clamp itself helps to keep the bag in its requisite oval shape. Loops are affixed to

the outer side of the bag, by which it may be sustained and secured in its place.

When about to apply the bag having internal septa I put ice (broken into pieces about the size of a small walnut) in the opening on the side nearest the loops until the contents of the lowest cell reach up to the bottom of the second cell. I then put ice in the middle opening until it reaches up to the bottom of the third, or top, cell, and finally, having filled the top cell, close the bag with the clamp. *It is of the utmost importance that the bag be filled only in this manner;* otherwise there might in the middle third part of it be two, and in the upper third three, layers of india-rubber between the ice and the patient's back. I take care that each cell is not so filled as to cause it to become round, otherwise only a small portion of the bag will touch the back. A further precaution is necessary: ice contains a considerable amount of air, and there is a greater amount between the lumps of the ice put into the bag; this air, as the ice melts, accumulates at the top of the bag, and being a bad conductor of heat, prevents the still unmelted ice which it surrounds from exerting its intended influence; I therefore unscrew the clamp occasionally, and thus let the air escape, and, if the bag is to be worn for a considerable time, replace the air by a little fresh ice.

In order to keep the bag in its position most securely, and at the same time to allow the patient to remain upright or to walk about, I pass an elastic band through the upper loops of the bag and then round the head. The bag is thus held close to the back of the neck. In some cases I pass a long tape through the lower loop ,carry each half of this tape over the shoulders, cross one over the other in the front of the chest, carry them backwards round the waist in order to clasp the bag closely into the small of the back, and then, bringing them forward, tie them in front. The bag will thus be sustained chiefly by the shoulders instead of by the head. This method of securing the bag is, however, not essential: it may be sustained, in the case of men, by buttoning the waistcoat and coat tightly over it; and, in the case of women, by tightening their dress over it in like manner. Of course, when stays are worn, it is necessary to loosen them sufficiently to allow the bag to pass down between them and the back. But I know no way of keeping the upper segment of the bag in close apposition with the back of the neck equal to that by means of the elastic band used as described.*

* The bags, as described in the text, have been patented in England, on

Until ice shall be habitually kept on board passenger-vessels, persons liable to sickness must of course continue to suffer, unless they provide ice for themselves; to do so, except for short passages, would be difficult; but for passages of a few hours only, each passenger may easily supply himself with the requisite quantity of ice. Each bagful when applied to the back melts in about two hours, faster or slower, of course, according to the temperature of the weather. For the passage between Dover and Calais one bagful suffices; one will also suffice between Folkstone and Boulogne, unless in cases of peculiar severity. Between Newhaven and Dieppe three bagfuls are required; between Dover and Ostend two. As the Channel steamers do not yet carry ice, passengers who intend to use it between Dover and Calais, or between Folkstone and Boulogne, will save themselves trouble by having a bag properly filled in London, and then packed in a mat or carpet-bag, or any other convenient vehicle, surrounded by an abundance of sawdust or several folds of a thick woollen rug or other woollen material. Shawls, flannel vests, or petticoats, and woollen coats, with which the traveller's carpet-bag may happen to be provided, will answer the purpose quite as well, and, if so used, the only addition to the luggage is the ice-bag with its contents. Thus packed a short time before the train starts from London, it may be conveyed to Dover or Folkstone ready for immediate use, the ice having melted very slightly meanwhile. For passages of several hours, unless two or three ice-bags are taken on board, prepared and packed as above, it is necessary to take a supply of ice packed in plenty of sawdust by the ice-merchant, and an ice-breaker by which it may be reduced to fragments as wanted. From two to three pounds of ice for every two hours the passage lasts would be the quantity required by an adult.

In the great majority of cases the treatment of sea-sickness need consist in nothing more than keeping along the centre of the back an ice-bag, constructed, prepared, and sustained as described, and extending throughout the cervical, dorsal, and lumbar regions, or from the top of the neck to the lower part of

the Continent, and in the United States of America. They may be obtained of C. Macintosh and Co., the manufacturers, 83, Cannon-street West, London; S. Maw and Son, 11, Aldersgate-street, London; John G. Gould, 198, Oxford-street, London; Thomas Chapman, 56, Buchanan-street, Glasgow; J. Mardon Wilson, jun., North-east Corner of Ninth and Sansom Streets, Philadelphia; and also, by order, of all surgical instrument makers and druggists.

the hollow of the back. So long as the liability to sickness continues, cold must be applied as directed. The results of the experiments made under my direction in the treatment of sea-sickness in this manner, induce me to believe that, as a general rule, the effect of this simple expedient will be the annihilation of all unpleasant symptoms: the sickness will stop; if diarrhœa is present, it will be subdued; if the patient is only threatened with it, the attack will be averted; if he has been exhausted by vomiting, he will be quickly soothed into a refreshing sleep; if there be headache, with coldness of the forehead, the pain will vanish; the cold clammy sweat will cease to be exuded; the cold skin will become warm again; the muscular system will regain its usual strength; the mind will recover its energy and pleasurable interest in surrounding objects; and the sickly pallid features will resume their expressive energy and healthy hue.

Persons differ, however, so greatly from each other in respect to their liability to sea-sickness, in respect to the parts of the nervous system most easily affected, and in respect to the facility with which the circulation may be influenced by cold applied along the back, that many cases of sea-sickness in persons otherwise accounted healthy will demand special study and special treatment. Moreover, in cases of constitutional or local diseases, or even of mere functional disorders, additional knowledge of the physiological action of cold, when applied to the back, on the various parts of the body, and additional care and precautions in prescribing it, will be essentially necessary.

Persons whose liability to sea-sickness is not extreme will, I believe, generally find that the malady may be wholly prevented by applying ice, as directed, as soon as they find themselves becoming ill. In such cases the degree of cold requisite for stopping the sickness will most frequently be obtained if the bag be placed outside the shirt or chemise, and in some cases even outside the flannel vest, when such garment is worn. I have satisfied myself, however, that *in all cases it is much the best to let the ice-bag come in direct contact with the skin.* For the reasons given in Section II., *care must be taken that the cold does not come in contact with the occiput or back part of the base of the head:* indeed, I advise that the ice-bag be not brought higher up the spine than the middle of the back of the neck. When the ice-bag is lain upon it tends, even if at first properly placed, to slip upwards, and is thus liable to come in contact with

the base of the head, without the patient becoming aware of the displacement. This tendency must be carefully guarded against. The part seemingly most sensitive, and that corresponding physiologically to the stomach and bowels, extends from the lower angles of the shoulder-blades to the lower part of the hollow of the back. It is, therefore, of paramount importance that the lower segments of the ice-bag extend completely over this region and be pressed in close contact with it. If there be headache, and if the forehead be at the same time cold, the upper part of the bag must also be kept in close contact with that part of the spine between the shoulders, and along the lower half of the back of the neck. If, however, in exceptional cases, while the head aches, the forehead should be hot and the face flushed, the cold thus applied, must either be lessened or wholly withdrawn. It will be found in some cases most desirable merely to modify its intensity by placing a pocket-handkerchief (a silk one is best), folded to the requisite degree of thickness, between the bag and the upper part of the spine. The handkerchief must extend along the cervical and the upper third of the dorsal vertebræ, or from the nape of the neck downwards to between the shoulders. Experience will teach those who use ice along the back, that it seems almost as if there were a wonderful intelligence in the nervous centres of the whole spinal region, which denotes by quickly expressive and unmistakeable feeling the exact parts where the application of ice is most desirable, and where it should be omitted. I recommend all who use it to attend to these intimations as trustworthy oracles.

Patients of preternatural sensibility in the spinal region, or who are unusually liable to sea-sickness, ought not only to apply the ice-bag direct to the skin, but also for a considerable time —say half an hour, or an hour even—before they go on board ship. When the patient is leaving an inland town for the coast with the intention of proceeding direct from the railway carriage on board the vessel, it will be best to apply ice while still in the railway carriage. In many such cases this preliminary application need be made to the lumbar and the lower part of the dorsal region only; but in all such, until the person goes on board, or rather till the movement of the vessel begins, I would urge that the feelings should be consulted, as to whether the ice should be extended along the upper part of the back or not. In these cases of preternatural sensibility, while the

patient is on board the ship, should there be any motion and should the tendency to sickness have not completely subsided, it will be necessary that the ice be kept to the back *without the intermission of even a few minutes*, so speedily does the excess of blood recur in the nervous centres while the motion of the ship continues. In order to insure the uninterrupted application of ice, such sensitive patients ought to be provided with two bags, so that one can be replenished with ice and ready for immediate application before the other is removed.

Medical advisers of persons with tender lungs will have to urge upon them the need of taking special precautions in using ice in the manner here indicated. For reasons which I shall shortly mention, they will often be able while on board a ship in motion to bear with impunity ice along the dorsal region, although, if on land, they might not be able to do so. Therefore, unless in very urgent cases, it would be well for them not to apply cold to the dorsal region until on board the ship in actual motion, and then, if they should experience any unpleasant sensation whatever in the chest, they should restrict the application of the ice to the cervical and lumbar regions only. It will be necessary also to proceed cautiously in applying cold to the lumbar region of pregnant women, and of women during the period of menstruation. I have had as yet no experience in the treatment of such cases of sea-sickness;* but as I have demonstrated that ice to the lumbar region will both induce and increase the menstrual flow, and as, from *à priori* considerations, I believe it probable that ice so applied in the case of pregnant women will facilitate abortion, it is expedient, until experience has afforded positive knowledge in this matter, to proceed with great caution; to attend to the sensations of the patient sedulously; and, if the ice be applied to the lumbar region, to remove it immediately any unpleasant feelings are experienced. The same reason, however, which will allow persons with tender lungs to use ice with greater impunity on board ship than they could do on land, will also allow the two last classes of patients to do the same, and hence I anticipate that with the exercise of a due amount of prudence, aided by adequate physiological knowledge,

* Since I wrote this passage, which appeared in the first edition of this pamphlet, the lady whose experience of the value of the ice-bag in stopping sea-sickness is given as case XXXVI., has informed me that, in her case, the ice induced menstruation several days before her usual time.

all three classes of patients may, without injury, save themselves from sea-sickness by the remedy in question.

As an ancillary remedy which has often been found useful, I recommend the drinking of iced water, or better, the swallowing of small lumps of ice. Assuming the proximate cause of the malady to be what I have affirmed it to be, it will be seen at once that ice, brought in contact with the peripheral ends of the nerves of the stomach, will act on the same principle as it does when applied to the spinal region: it acts as a sedative, and so far, at least, as the stomach is concerned, lessens the number of irritating impressions which would otherwise be transmitted from that viscus to the spinal cord, the reflex action of which is thus also lessened.

A far more important, and indeed in some rare cases an indispensably necessary ancillary remedy is the assiduous application of warmth to the feet, and even to the surface of the body generally if it be very cold. In all cases it is desirable that patients especially prone to become cold be kept warm by an abundance of woollen clothing. I have said that as a general rule the application of the ice-bag will cause the full re-establishment of the peripheral circulation, the diminution of which produces the fall of temperature resulting in the distressing sensation of coldness experienced by persons who are sea-sick; but in some patients the contractile force expended on the arteries is unusually great, while the attraction of the textural elements for blood is very feeble. In such cases the action of the ice must be aided by a resort to such measures as may be necessary for keeping the patient comfortably warm. The feet and head need most especial attention, for the circulation in them is likely to be most injuriously reduced. Sometimes the feet only are very cold; in that case they should be well wrapped up, and, if needful, a "foot-warmer" or hot bottle should be applied to them. Sometimes the head, particularly the forehead, becomes deadly cold; when this happens care should be taken that while the ice-bag is well applied along the lower part of the back of the neck and between the shoulders, the head is surrounded with a woollen cap or suitable wrapper of some kind, and speedy relief may often be given by the warm hand of a healthy person placed on the forehead of the sufferer.

Section V.

Evidence that Ice along the Spine is agreeable, and why it is so.

Objections have arisen, and will no doubt long continue to arise, in the minds of persons unacquainted either physiologically or experimentally with the mode of action of the spinal ice-bag, not only to its long-continued use, but even to its use at all as a remedy for sea-sickness. Many persons shudder at the idea of having a column of ice placed along the back, and think were it continued there for a moderately short time that the discomfort would be extreme, and more injurious results by its continued use would speedily follow. In answer to the objection, that ice to the back, in order to arrest or prevent sea-sickness must be so disagreeable as to make the remedy deserving to be characterized as worse than the disease, I shall appeal to the experience of patients. They not only find the cold pleasant, but crave that it should be more intense, and their feelings of the comparative agreeableness of the cold in different parts of the back are a very valuable guide to those particular points where, from constitutional peculiarities, the abnormal afflux of blood in the nervous centres is the greatest, and which therefore they instinctively desire should be rendered coldest.

In my work on *Diarrhœa and Cholera* (p. 44) there is a report of a case of a child suffering from severe choleraic diarrhœa, who was treated successfully by the almost continuous application of the Spinal Ice-bag, and of whom his mother said, "He sleeps every time the bag is put on; he seems to like it; he holds his head down to let the bag be put on directly I tell him the bag is coming, so I think it must be a comfort to him." At page 47 of the same work, I observe:—

"While I write, a note (dated July 31st, 1866) has just reached me from a physician who is making extensive use of Spine-bags in Scotland. He says, 'One thing has struck me much since I wrote you last—namely, the liking that sensitive chilly patients have for the cold bag to the spine, although frightened to think of it before they make trial.' In 1863 Dr.

Druitt came to my house to see the result of my treatment of paralysed and epileptic patients, of whom he saw five. He subsequently wrote me a letter, giving his impression of what he had seen. After confessing that he was agreeably surprised at the results of my treatment, and stating that 'there was no mistaking the testimony of the patients that those results had been most beneficial,' he observes, '*I learned from all the patients that the treatment had made them more comfortable; I mean as regards their general feelings of health and animal sensations, without reference to the relief of particular symptoms.* In my own practice, I lay the greatest stress on this point. It is true, that some methods of treatment are ultimately beneficial, although they may be most repulsive or nauseous, and give great discomfort and *malaise* for the time, but it will not be denied that, *cæteris paribus*, that treatment is most likely to do good which shall seem congenial to the whole feelings, whilst meanwhile the patient is saved much annoyance and misery.'"

It is in fact difficult to imagine that a remedy which relieves suffering, and in many cases causes the patient to sleep, can be otherwise than soothing and agreeable; and that the Spinal Ice-bag does these things is attested by an amount of evidence which makes doubt of its effects in these respects impossible. Referring to its application as a remedy for sea-sickness, Mr. Bradley, surgeon to one of the Atlantic steamers of the Cunard service, says (in a letter to the *Lancet*),—"I have applied it to young children, delicate women, and old people. In no case does it do harm; but in the great majority of instances it soothes the nervous irritability which so commonly accompanies sea-sickness, induces sleep, and so enables the stomach to receive light food, and consequently relieves exhaustion. . . . . I order it to be kept on a couple of hours; though as the patient sleeps, as is often the case, I never remove it until after waking." And Dr. Benjamin Lee, of Philadelphia, in an account of a case (given below at page 102) of extremely severe sea-sickness treated successfully by the Spinal Ice-bag, says: "The effects of the application of the Ice-bag were little short of miraculous. In three minutes the retching ceased and the spasms were calmed. In a quarter of an hour, she [the patient] had fallen into a quiet sleep; and in half an hour her hands and feet were of natural warmth, and her face had regained its wonted colour. In two hours she awoke, greatly refreshed, and from that time did not miss a single meal. . . . . She

slept peacefully all night, although the sea was very rough, finding no inconvenience from the cold poultice, *except when it happened to be pushed off the spine.*"

The following evidence of the soothing and agreeable effects of the ice is also extracted from the reports of the *Experiments* described in the following Section :—

CASE I.—"I think nearly every one was sick, and I, the usually most of all, not only not sick, but even well, feeling as if I were in a cradle, being rocked by the gentle hands of a tender nurse. . . . I don't know of course the effects of ice on a long-continued voyage, but I venture to believe that the feeling of perfect comfort would continue as long as the ice is kept on." CASE II.—"She felt the cold to the back peculiarly grateful, but wished it more intense; the bag was therefore placed next the skin. This change delighted her." CASE IV.—"In about ten minutes after the vessel started she became violently sick, the muscular effort being so extreme as to cause her to say, 'Oh, doctor, I think my heart is coming up!' I applied ice along the entire spine as quickly as possible, when she was *instantaneously* relieved, and then lay down upon the ice soothed and calm." CASE VI.—"About twenty minutes before reaching Boulogne, the ice in the bag was so nearly melted as to cause her to feel that the refreshing and sustaining influence of the cold was lessening. I therefore placed an additional bagful of ice outside her dress, and over the bag already supplied; this sufficed to restore the agreeable sensations she had hitherto enjoyed, and to continue them until she landed at Boulogne." CASE IX.—"During the second two hours of the passage (to Dieppe) she was fast asleep—lying on the ice. . . . She was particularly impressed with the relief afforded her by the ice, from the great suffering in the head which she had always experienced before when at sea." CASE X.—"After lying upon the ice, both her sickness *and headache* ceased entirely." CASE XI.—"She was lying down very sick, and complained especially of an acute headache. She was laid on a bag of ice, the bag being next the skin. The head became quite free of pain in a few minutes. . . . Still lying on the ice, she fell asleep. In about half an hour, she awoke quite well, and continued so." CASE XII.—"Having put on an ice-bag, I continued to feel ill about fifteen or twenty minutes, and then rapidly recovered; all nausea, sweating, and chilliness ceased, the colour returned to

my face, as observed by the Captain and some of the passengers; the troublesome threats of diarrhœa and uncomfortable sensations in the bowels passed away, and I continued quite well—really enjoying the remaining five hours of the passage to Dieppe. I wore the ice nearly the whole of the time." CASE XIV.—"He said he felt the cold agreeable and refreshing; in a few minutes he said he felt better; before long he expressed his astonishment at finding all uncomfortable sensations, together with the nausea, wholly gone." CASE XV.—"The lady fears the sea so much as to be in a fright the whole time; this time she was not *frightened* at all after the ice had been applied." CASE XVI.—"She soon became warm, and fell asleep with the ice on her back. She awoke very hungry, and quite well." CASE XVII.—"She was so delighted, poor creature, she thanked me a thousand times. The ice made her quite well, and she went to sleep with it on her back."

A little reflection by those who acquaint themselves with the *modus operandi* of the Spinal Ice-bag will, in fact, suffice to explain not only how it produces comfort, but how it cannot fail to do so when it is applied in suitable cases, and when it is applied rightly. It is not designed for the healthy, but for the sick, and only for that portion of the sick in whom has become established precisely that morbid condition of the circulation of the blood in the nervous centres which the application of cold is of all agents the most capable of subduing. Hence, in these cases, and in these only, inasmuch as the Spinal Ice-bag subdues a morbid condition in the very citadels of life—a condition in which the phenomena of the disease in question originate, and inasmuch as the cold restores the circulation of the blood in those nervous centres to its normal state without contaminating or embarrassing the system with any medicines, it seems *à priori* that such physiological changes must inevitably be accompanied with sensations of comfort and pleasure, as experience shows them to be. And such is the case when sea-sickness is treated in the manner now explained: the ship's motions having induced an abnormal amount of blood in both the spinal and the ganglionic centres, there is necessarily a greater evolution of heat there than is usual during health; and hence it is that cold along the whole spinal region is not only tolerable, but positively pleasant. Moreover, it must be borne in mind that the ice does not come in direct contact with the surface of the body, which is shielded

from it by a layer of india-rubber; and that, as this is a bad conductor of heat, the full effects of the cold are not felt suddenly, but gradually, and therefore that nothing of the nature of a shock is produced when the bag is applied.

It would undoubtedly be a great blessing to all persons travelling by sea, and who suffer from sea-sickness, to become possessed of some magical remedy which they might take once for all, and which would permanently charm away their sufferings. But, by an inexorable logic of Nature, results unfortunately, or fortunately, are continuously produced so long as their causes continue to operate. The ultimate cause of sea-sickness is the unstable sea, and as that cause is likely, with intervals of calm, to be everlasting, so will its result—sea-sickness—continue in each patient until his organization has adapted itself to live on a moving surface; or unless that result is averted by a remedy as continuously active as the cause itself.

This subversion of those physiological conditions on which the derangement of the viscera constituting sea-sickness depends, can only be effected by a remedy, the operation of which can be continued as long as those conditions continue to be induced. Sufferers will have to choose between the continuance of their sufferings during uncertain lengths of time, and the slight trouble and inconvenience of wearing an ice-bag along the back, and of having it replenished each time the ice melts. I affirm confidently, however, that when they have once made their election in favour of the ice-bag, they will have no doubts afterwards as to the wisdom of their choice.

The objection to the remedy which possibly, but not probably, may prove really formidable is that, in cases of long-continued sea-sickness, the long-continued use of ice may prove physically intolerable, as it may induce physiological or pathological conditions in the body of the wearer of a character more injurious and troublesome than sea-sickness itself. I do not, however, expect this result. If ice were worn continuously during many days consecutively by a person on land, it might be productive of grave consequences, the more so, of course, if the wearer were suffering from some constitutional malady which involved an abnormal diminution rather than afflux of blood in the nervous centres along the back. In respect to a person at sea, however, in a vessel moving sufficiently to make him sick, the case is widely different. An undue afflux of blood in the nervous centres along his back is produced by a cause continuously operative,

and, therefore, ice applied along his spine does not reduce the amount of blood in those centres below the normal standard, but only prevents it from increasing beyond that standard, and so long as it only does this it can only do good. This being the case, I venture to predict that ice may be applied to the backs of otherwise healthy persons suffering from sea-sickness, so long as they would continue to be sick if it were not thus applied; and that, for the same reason, ice to the dorsal region of persons with tender lungs, and to the lumbar region of pregnant and menstruating women, may also, as a general rule, be applied with impunity, seeing that the unusual amount of blood brought into the different regions of the nervous system just mentioned, by the continuous motion of the vessel, operates as a shield against that special influence of the ice which, in their case, might prove injurious were they on land.

I have made no change in the foregoing paragraph since it appeared in the first edition of this work; and now I can adduce evidence proving the general correctness of the prediction therein expressed. Case XVIII., given in the next Section, is an example in which ice seems to have been worn during the greater part of the time occupied in crossing the Atlantic, and no kind of inconvenience from its use was complained of; Case XXVII. exemplifies the use of ice at frequent intervals throughout the passage to New York, the result of each application being exclusively beneficial; Case XXIV. shows that a lady who was pregnant, and who was a great sufferer from sea-sickness, was enabled to make the voyage from Philadelphia to Havana and back with unprecedented comfort to herself; and that so far from being threatened with miscarriage by the use of the spinal ice-bag, it actually rescued her from that danger, by arresting the violent retching and tendency to convulsions from which it was feared a miscarriage might result. Case V., reported in the first edition of this pamphlet, shows that a patient liable to hæmoptysis may, when actually sea-sick, apply ice with impunity; but Case XXXIV. proves that a consumptive patient, instead of suffering in the chest from the use of the ice-bag, may find it an unspeakably valuable boon while making a voyage in quest of health.

Section VI.

Cases and Results.

Case I.—Mademoiselle H., who left London at 8.30 P.M., February 19, 1864, and crossed from Dover to Calais the same night, was the first person on whom the experiment of arresting sea-sickness by the application of ice to the back was tried. I had previously crossed the Channel with her more than once, and can testify that I have never seen a person suffer more terribly from sea-sickness. Indeed, her suffering is usually so excessive, and it exerts such a depressing effect upon her, that after leaving the vessel she continues ill for many hours.

When she left London, at the date mentioned, I supplied her with an ice-bag of suitable length properly filled with ice. This bag I packed in a small mat-bag and carefully surrounded every part of it with sawdust, in order to prevent the ice from melting. Thus prepared, the ice-bag was ready for immediate use. The following is the lady's report of its effects :—

"Hôtel de Lille et d'Albion, Paris,
"Feb. 21, 1864.

"Dear Doctor,

"The experiment, though sadly managed, has been crowned with the *utmost success*. The train was so late that when it arrived at Dover, we were literally thrown into omnibuses and cabs, and reached the ship just a minute before she started, and I found only the time to undo your rather too-well packed parcel, and to ask a stupid boy of a steward to push the bag down my back. Of course he could not manage it, and nobody else being there, I was left to myself to arrange it as well as I could. After a little time I felt that my flannel habit-shirt was under the ice-bag, which I wished to be near the skin and a little lower down, as the boy had scarcely brought it to the middle of the back. The sea was very rough, and I feared much movement might make me sick. In these struggles the india-rubber in the lowest division gave way, and only a quarter of an hour

after we started a hole was made, which allowed the melted ice to pour down my back. You can imagine what a pleasant feeling this perpetual stream was during a cold night.* I shivered violently,† but feeling otherwise quite well kept the bag convulsively to my back, keeping the part to which the clasp is attached round my throat.‡ I think nearly every one was sick, and I, the usually most of all, not only not sick, but even well, feeling as if I were in a cradle, being rocked by the gentle hands of a tender nurse. The longer I remained in this state the more inclined I was to think, 'Oh! I shall soon be sick; this can't last.' But wonder over wonder, we reached Calais, and I had not experienced even the slightest nausea; though I feared the wet clothes would give me a cold, which they have done. You know what a bad case I am; you have seen the state in which I have been when crossing the Channel; and you will be able to judge what a much better effect will be produced when the bag is *sound*, and when the whole is *properly managed*; but even under the trying circumstances the success has been complete, and I may venture now to go to America, provided the ship has an ice-room to give a fresh supply when the old is melted. I don't know, of course, the effect of ice on a long-continued voyage, but I venture to believe that the feeling of perfect comfort would continue as long as the ice is kept on. I had eaten very little in the day, and my stomach began to feel empty on the sea, so that I could have eaten. You know when we arrived at Calais I never was able to touch anything: I took this time a cup of beef-tea with great delight. Of course you must have further evidence to state this, to my mind, most important discovery as a positive fact. Yet fancy me *hearing*

* It snowed at the time she started from the Victoria Station, and probably continued to do so while she was on board the boat.

† It is right to observe that she is apt to shiver on the smallest provocation, even in summer; on this occasion, however, as she was on the deck of a vessel in a snowy night, with melted ice running down her back, her shivering was certainly not to be wondered at; but had the bag not burst, the *dry* cold to her back would have helped to warm her. During the very coldest days of last winter (1863-4) a paralytic patient, whom I was treating at Guy's Hospital, was the only one walking about the grounds on several occasions when I visited the hospital: he had a column of ice on his back! The other patients shrank from the cold, and while those in the ward with him huddled round the fire, he had no wish to go near it.

‡ The elastic band in question ought to have been passed round the head, the front part of it crossing the upper part of the forehead in the same way as the velvet head-bands, fashionable some years ago, were worn.

them vomiting violently, and I *feeling well* all the time. I am quite ready to give any evidence, or report to whomsoever you will direct to me."

The desire for food which Mademoiselle H. says she felt while still on board the boat, seems to be far from unusual in persons with ice on the back while at sea, and who without it would be sick. It will be seen that Mrs. H., in Case II., longed for a beefsteak; and that in Case XII., after I had been cured, I ate heartily of biscuits and cheese and drank a bottle of ale, my appetite-giver being kept close to my back meanwhile.

Case II.—Mrs. H. This lady usually suffers extremely when at sea from sickness and intense headache, and on two occasions had a series of epileptic fits, induced also by the ship's motion. She suffered in this way while passing from Boulogne to Folkstone in May, 1863, and previously while going from Rhyl to Liverpool, when after being taken out of the vessel she was, as stated in her letter, regarded as at "the point of death" by her medical attendants.* During this passage she had a succession of fits lasting the whole time. Although she has only lost her consciousness during these two passages, she generally suffers from "tonic" spasms in various parts of the body, especially in her limbs, which become rigid. She is also liable to violent and frequent attacks of hæmoptysis. So slight is the motion needed to make her sick, that she is often made so merely by travelling in a railway carriage.

She came under my care in June, 1863, on account of her epileptic attacks, which, although formerly frequent, now never occur. Thoroughly impressed with the efficacy of the treatment, chiefly by means of ice, adopted in her case, and feeling assured that if by the same means she could be saved from sea-sickness, the remedy might be justly regarded as established, she consented not only to have ice applied to her back each time she crossed the Channel in going from London to Paris and back, but also, in the interests of science, to make a special trip between Folk-

* That she was in a state seemingly justifying their opinion, I can readily believe. I have since seen her in a like state, and believed that life had become extinct. The surface of the body became cold, her face pallid, her head fell forward while I sustained her body in a sitting position; I could detect neither pulsation of the radial artery, nor any sign of respiration, and I expressed to her sister, who was present, my fear that all was over.

stone and Boulogne. I accompanied her on each occasion. During the first passage a friend of hers crossed with us: the experiment he made is described as Case VII. The following is a report of her experience :—

May 12, 1864. We left London by the tidal train for Boulogne. While in the train Mrs. H. had headache and felt sick. As soon as we reached Folkstone, and before going on board the steamer, I applied an ice-bag to her back; it extended along the lumbar, dorsal, and the lower half of the cervical region, and was outside her thin dress. She wore no stays. She remarked that the sensation caused by the cold was very agreeable. The steamer left Folkstone at 1 P.M. The day was clear, warm, and fine; there was a tolerably fresh breeze, but the sea was so far smooth that only three of the passengers, whom I observed, vomited.* I did not feel the least nausea.

Soon after the steamer started Mrs. H.'s head became hot and very painful, and her cheeks flushed. She said her headache was of a kind peculiarly intense (a sense of extreme pressure), and never felt by her except when at sea. I therefore placed a silk handkerchief between her neck and the bag, extending it downwards between the shoulders. Her head then became gradually better, and before long quite clear and free from pain.

She felt the cold to the back peculiarly grateful, but wished it more intense; the bag was therefore placed next her skin. This change delighted her; but she said the bag did not extend low enough down. I then applied a second bag in the lumbar region outside her dress; this addition was felt to be a great improvement. Before the bag was placed next the skin she felt fearful she should be sick, but afterwards this fear soon passed away, and she reached Boulogne without any sign of sickness.

At one part of the passage she said, "There is a strange contest going on within me, one force against another: the body seems to say—'I will be sick,' the ice—'But you shan't.'" She afterwards informed me that she apprehended an attack of diarrhœa, as she had all the feelings usually preluding it, and even feared she should be forced to the cabin "for ladies only;"

* I exerted all the persuasive power I could to induce them to let me cool down their dorsal nervous centres; but the resolute incredulity with which my promises of relief were listened to, and my proposals to supply ice and ice-bags at my own expense were rejected, evinced but too plainly their conviction that I was suffering from a malady which entitled me to board and residence free of expense at Colney Hatch.

but, thanks to the ice, this dread vanished beneath its influence, as well as every feeling which induced it.

Ordinarily she could not have borne the ice two hours without becoming ill; but during the passage she thoroughly enjoyed it, and craved for it still colder. After the ice had been placed next the skin, she felt so well that she wanted a beefsteak on board the boat. She bore the whole journey to Paris immediately afterwards remarkably well, eating a hearty dinner at Amiens. Being, however, without ice, which, applied to her back, would have prevented the sickness caused by her travelling by rail, she felt sick before reaching Paris, and threw up her dinner on arriving at the station.

After reaching Paris she wrote me the following letter:

"Hôtel de Londres, 5, Rue de Castiglione,
"Paris, 14 May, 1864.

"Dear Doctor,

"At your request I write you my impression of the value of the experiment, made on the 12th instant, in order to test in my case the power of ice in preventing sea-sickness.

"Merely to say that I crossed the Channel without being sick and without feeling nausea, and that I ascribe this fact to the ice applied to my back during the passage, would in no sense convey to you my estimate of the value of your discovery. You must know what a victim I have been on all previous occasions when on the sea, before you can understand the inexpressible relief I now feel in thinking of having to cross the Channel or to make a sea-voyage.

"In the first place, I so easily become sick that I often am made so by the movement of a railway carriage. Previous to my passage from Folkstone to Boulogne on the 12th instant, I had crossed the English Channel fourteen times, and the Irish Channel twice. I have been to the Isle of Man, and I have been in steamers between Liverpool and various parts of the Welsh coast at least two hundred different times. On all these occasions, excepting three or four, I suffered fearfully from sickness; during the three or four times when I escaped sickness the sea was as smooth as glass, but even then, after I got on shore, I either vomited or was ill. I am so prostrated by the effect of the movement, that on two occasions it has been necessary, when the vessel arrived in port, to carry me on shore. Once in Liverpool I was so deadly cold and stiff that it was deemed expedient to

put me in a warm bath, just as I was taken out of the vessel, without removing my clothes, and the two physicians attending me expressed their belief that I was on the point of death. On this occasion I was a prisoner in the hotel, confined to bed six days, and even when sufficiently recovered to leave the hotel I was obliged to be carried from my room to the carriage in which I left. This is the only time when I have suffered so severely, but on almost every occasion I was ill several days after landing from the vessel.

"You will now be able to form some idea of the horror with which I have always contemplated the prospect of a sea-passage, and of the unspeakable blessing which your discovery has conferred upon me as on all who suffer like me. Indeed, such have been my usual feelings about crossing the Channel, that even when I had reached the French shore, saved from all suffering, it seemed almost impossible for me to realize the fact, and I could not help relapsing unconsciously from time to time into the old feeling of terror at what I had still to suffer."

Case III.—May 22, 1864. Mrs. H. crossed from Boulogne to Folkstone. The day was fine, the sea smooth, and the motion of the vessel very slight, but still sufficient to make her speedily sick. Before leaving Boulogne she lay on an ice-bag nearly two hours, and then went on board the steamer without the bag, which was not applied during the passage. She crossed the Channel without feeling any nausea; but just before reaching Folkstone she suddenly vomited once, without, however, previously feeling ill or any of the usual retching or muscular effort which causes so much suffering.

This experiment is interesting as an indication that, if before a person starts in a vessel, the excito-motor power of the spinal cord be reduced by the application of ice to the back, sickness may be averted, or its vehemence lessened for some time after the vessel has put to sea. This fact received some confirmation from the experiment next recorded.

Case IV.—At 10.30 P.M. of the same day, Mrs. H. left Folkstone for Boulogne. It was a clear, starlight night, and the sea was about as smooth as it had been during the previous passage. No ice was applied to her back either immediately before (as in the former case) or when leaving, but she lay down as soon as *she got* on board.

In about ten minutes after the vessel started she became violently sick, the muscular effort being so extreme as to cause her to say—"Oh, doctor, I think my heart is coming up!" I applied ice along the entire spine as quickly as possible, when she was *instantaneously* relieved, and then lay down upon the ice soothed and calm, though still feeling nausea. In the course of about fifteen minutes she again suddenly threw up some fluid, but without any evidence of muscular effort, retching, or distress. In about fifteen minutes more she did the same, the stomach alone seeming as before to contract for the expulsion of the fluid without any aid from the thoracic and abdominal muscles. She then lay still a long time on the ice without sickness, but without entirely losing the feeling of nausea. A fog came on, and as much caution was needed in trying to find Boulogne harbour, we did not reach it till 3 A.M. She afterwards went on deck, the ice being still applied to her back, and though there was quite sufficient movement to have kept her sick under ordinary circumstances, she lost her sense of nausea, walked about, and, notwithstanding the fatigue of a four and a half hours' passage and her loss of sleep, felt quite well and very hungry on reaching the hotel at Boulogne. Having slept till a late hour in the morning, she rose as well as usual.

CASE V.—This was made under peculiarly unfavourable circumstances. Mrs. H. had been very ill in Paris during the previous few days, had mental troubles, some cerebral disturbance in consequence, and June 13th a considerable attack of pulmonary hæmorrhage. Nevertheless, she felt it necessary to come to London. I was provided with a free pass between London and Dieppe by the Brighton Railway Company in order to facilitate my experiments; and having taken my daughter over the Channel by that route on our way to Paris, I had again an opportunity of re-crossing the Channel with Mrs. H., who, relying on the ice, resolved to encounter the long passage between Dieppe and Newhaven. On account of her recent sufferings and hæmoptysis and her consequently enfeebled state, I felt of course some considerable apprehensions as to the possible effects upon her of a sea-passage lasting several hours, if she did not use ice, and was almost equally fearful of using it lest it should bring on a fresh attack of hæmoptysis. However, for the reasons already given, I considered that the danger of applying ice in such a case is greatly lessened while the patient is sea-sick or has a tendency

to become so, and its application was determined on as the lesser of the two evils, one of which must be chosen.

I filled seven ice-bags with ice in Paris, enclosed them in a bagful of sawdust, and thus prepared, we left for Dieppe in the evening of June 14th, and at 3 A.M. June 15, 1864, we started from Dieppe to Newhaven. Deprived of her night's sleep, and having had very little rest between leaving the train and going on board the boat, Mrs. H. was of course in the least favourable condition for bearing the passage she was about to enter on.

It was fully resolved that ice should be applied before the vessel started: but in Dieppe harbour there was such a perfect calm that we were quite confident the sea would be smooth; the sailors were of the same opinion; and consequently the ice was not applied as intended. Not many seconds, however, after the vessel had got clear out of the harbour, we became painfully sensible that there was a strong head wind; the vessel began to pitch, the water to dash over her, and soon there was only one part of the whole deck, and that only two or three square yards, which was not continually washed by the violent spray. Both funnels were white with long lines and layers of salt deposited upon the hot iron from the sea-water which was copiously dashed against them and rapidly evaporated. Only one passenger besides myself remained on the quarter-deck—a Frenchman, who, standing on a seat, lashed himself to the shrouds, and there, bolt upright, gazed steadfastly to windward, being drenched incessantly meanwhile from head to foot by the spray!

Immediately the motion of the vessel began, Mrs. H. began to be ill. We were on deck at the time, and as the ice-bags were in the cabin there was necessarily a slight delay in getting them. During that short time she became rapidly worse. She complained of an indescribably intense headache; her face was extremely flushed; she retched most violently; vomited several times;* and the muscles of her limbs became rigid. We both feared that an epileptic fit was inevitable. However, notwithstanding her constant straining and partial rigidity, I succeeded in applying cold along the upper part of the back, and thus at once averted the fit and arrested the extreme retching and straining which so distressed her. Unfortunately the demon of sea-sickness had already got such hold of her that, her bowels be-

* The vomited matter consisted partly of the food which she had eaten for breakfast the day before! Of course, such being the case, she was strongly predisposed to be sick.

coming affected, she was forced immediately to leave the deck and go down to the cabin "for ladies only." Afterwards she lay on a sofa in the ladies' cabin. I ventured to *look* in at intervals; but though all the inmates were prostrate, several of them vomiting, and though I pleaded for admission in my professional capacity, the stewardess, faithful to Mrs. Grundy, sternly refused to allow me to go near my patient. I tried to induce the said devotee to apply the ice for me as I should direct, but having an opinion of her own that it would only increase my patient's sufferings, and resolved that what she evidently deemed my insanity should not be gratified in that way, she not only obstinately refused, but tried to use her official authority to force Mrs. H. to cease applying the ice as best she could for herself. Weak and ill as she was she could not manage to get the bag down within her dress to the hollow of her back, and so was fain to lie on it outside her dress in the lumbar region. When the ice was melted, the inexorable stewardess stoutly refused to fetch a fresh bag, and only when at length addressed in a very "imperative mood" indeed did she reluctantly obey.

I ventured occasionally to look at my patient from the doorway of the cabin sacred to womankind: I once saw her vomiting, and on each other occasion lying down seemingly asleep. When we neared Newhaven, she rose, arranged her dress, and walked ashore, wonderfully little pulled down compared with what I anticipated, took a cup of tea at Newhaven, and bore the journey to London immediately afterwards very well indeed. She had experienced no trace of hæmoptysis, no dyspnœa, and no feeling whatever of pulmonary congestion—symptoms which on land she had often experienced. She said that, notwithstanding the partial and unsatisfactory way in which the ice had been applied, and though she had often vomited and felt constant nausea, she had slept several times, that the contents of the stomach came up without effort, that she was saved all the dreadful straining so common in sea-sickness, and that she had remained wholly free from muscular rigidity or cramp in every part of her body. This last fact alone, she said, was of unspeakable importance to her; but she was confident that she might have been saved from sickness altogether if the ice had been properly applied next her skin some time before going on board and throughout the passage. The result of the next experiment seems to justify this opinion.

Case VI.—July 26, 1864. Mrs. H., accompanied by myself, left London to cross the Channel from Folkstone to Boulogne. When about half-way between London and Folkstone, a short bag of ice was applied along the lumbar and lower dorsal region, and just before the train reached Folkstone a long bag was applied next the skin, over the lumbar, dorsal, and lower cervical regions. Having the bag thus applied, she went on board the steamer. She was neither sick nor felt nausea in the train.

There was a brisk breeze, and the motion of the vessel was very considerable: many passengers on deck, and many more in the cabins, were sick. Mrs. H. sat on deck quite tranquil, engaged in conversation, and reached Boulogne not only without being sick, but without feeling the slightest nausea. The remembrance, however, of her terrible sufferings when formerly at sea filled her with fear lest she should again be ill, and as she got nearer and nearer the French coast, she exclaimed several times, "Well, it's astonishing, incredible!"

At one part of the passage she said—"Doctor, I don't know whether you have ever noticed that one of the first symptoms of sea-sickness is coldness of the feet and legs; do you know mine are becoming cold?" I reminded her that she was making a foot-stool of the carpet-bag containing the ice-bags filled with ice, and immediately removed it. She soon ceased to complain of cold feet, and had no other unpleasant symptom. About twenty minutes before reaching Boulogne the ice in the bag used was so nearly melted as to cause her to feel that the refreshing and sustaining influence of the cold was lessening; I therefore placed an additional bagful of ice outside her dress and over the bag already supplied; this sufficed to restore the agreeable sensations she had hitherto enjoyed, and to continue them till she landed at Boulogne.

Case VII.—May 12, 1864. A friend of Mrs. H.'s, Mr. A., who accompanied us from Folkstone to Boulogne at this date, as already stated, felt decidedly sick, and looked so, but did not vomit; I therefore urged him not to avail himself of the ice until he should become actually sick, as I was anxious to have indubitable evidence of his sickness, and the opportunity of testing the power of the ice to arrest it after it had begun. Being one of my patients, and having benefited greatly from the use of ice, he knew its value, and therefore, feeling so unwell, was unwilling to wait as I begged him to do until he should actually vomit before using it. Left to

take charge of Mrs. H. while I went to another part of the vessel, he helped himself to a bag of ice in my absence. The change which it speedily wrought in him was astonishing: he quickly looked and felt as well and as fresh as possible again.

Case VIII.—Mr. L. came from Aberdeen to London by steamer to place himself under my professional care. He suffered much from sea-sickness during the passage. I acquainted him with my method of treating sea-sickness, hoping that on his return he would test its value. He was called home very suddenly, and therefore I had no opportunity of taking care that he should be properly supplied with ice for the experiment. Unfortunately he took, as it seems, only one bag of ice, but so far as the experiment went, the result, as reported in the following extract from a letter which he wrote me, May 24, 1864, is satisfactory:—"I filled the bag with ice before sailing, and put it on in the evening. I did not feel squeamish while it was on, but suffered a good deal afterwards, as the ship rolled very much. I had not ice to fill the bag a second time."

Case IX.—Mdlle. G. has been six times at sea, viz., from Marseilles to Civita Vecchia, and back; from Ostend to Dover, and back; and from Dieppe to Newhaven, and back. On each occasion except the last, when ice was used, she suffered much from sickness. After reaching Civita Vecchia, having been sick during the whole passage, she continued ill during three or four days from the effects of the motion at sea. On returning from Civita Vecchia the sea was calmer than when she crossed on the occasion about to be described; but after being on board the steamer about three hours she became ill and sick, and continued so during the rest of the passage. During the other passages mentioned she was ill nearly all the time, the head being especially affected.

On the 27th of May, 1864, she left London for Paris, and crossed the Channel *vid* Newhaven and Dieppe. She took with her four ice-bags, which were filled in London, and packed in sawdust. She was thus saved the trouble of breaking up the ice and replenishing the bag on board the steamer. As the ice in one bag melted, she replaced it by another. She applied the first bag as soon as the steamer started, and kept ice applied during the whole passage. The bag was not, however, placed next the skin, but over a thin dress and the chemise, along the dorsal

region; and over the chemise only in the lumbar region. During the first two hours she was quite well in all respects; during the second two hours she was fast asleep—lying on the ice; at a certain period during the third two hours she felt "a little headache and the stomach heavy." At this time she found the ice in the bag then applied to the back all melted; she applied a fresh bag, when soon these unpleasant symptoms vanished, and she reached Dieppe without experiencing the least sickness. She is quite sure, she says, that had it not been for the ice she should have become thoroughly ill. She was particularly impressed with the relief afforded her by the ice, from the great suffering in the head which she had always experienced before when at sea.

Case X.—June 11, 1864. I crossed from Newhaven to Dieppe. The day was fine; there was a fresh but not strong breeze, and just sufficient motion to cause about a dozen persons to become sick. Mrs. G., a young Frenchwoman, began to be very ill soon after the vessel left; she vomited bile frequently, was exceedingly pale, and complained of an intense headache. With much difficulty she was persuaded to allow me to apply ice to her back after her sickness had increased. In the first instance it was imperfectly applied—her dress being too tight to permit the bag to pass down to the lumbar region. Extending too high upwards in consequence, it came against the head and could not be closely applied to the back of the neck. While the bag was thus applied she sat on deck. She felt some benefit from the application, and at length went down to the cabin, where the bag was properly applied. Meanwhile she vomited two or three times. But after having the ice along the whole spine, and lying upon it, both her sickness and headache ceased entirely, and she became well, talking freely and cheerfully. After the bag of ice was melted she began once more to feel ill; a second bag was then applied, when she speedily became quite well again, and reached Dieppe continuing so.

Case XI.—June 11, 1864. Miss C., a young lady, aged about twenty-one, finding Mrs. G. had been thus relieved, asked to have the benefit of the ice. She was lying down very sick, and complained especially of an acute headache. She was laid on a bag of ice—the bag being next the skin. Her head became quite free of pain in a few minutes; after her head had become well and she had had the ice on about ten or fifteen minutes, she vo-

mited once more, and then, still lying on the ice, fell asleep. In about half an hour she awoke quite well and continued so thenceforward.

Case XII.—June 11, 1864. During the first forty-five minutes of the passage I felt fairly well, but then broke out in a cold sweat all over, became extremely pallid, felt sick, very uncomfortable in the bowels, and inclined to be purged. I was so ill that, though I had come expressly to treat persons sick, and though I saw a lady opposite to me suffering severely, I became indifferent and powerless to help her. Having put on an ice-bag, I continued to feel ill about fifteen or twenty minutes, and then rapidly recovered: all nausea, sweatings, and chilliness ceased, the colour returned to my face, as observed by the Captain and some of the passengers, the troublesome threats of diarrhœa and uncomfortable sensations in the bowels passed away, and I continued quite well—really enjoying the remaining five hours of the passage to Dieppe. I wore the ice nearly the whole of the time. Soon after becoming well I felt hungry, and heartily relished a lunch of biscuits and cheese with pale ale.

Case XIII.—June 15, 1864. I crossed from Dieppe to Newhaven, having the care of Mrs. H., as already mentioned. The state of the weather during the passage is described in the account of her experience at that date. I soon began to feel very ill: my skin became cold and covered with a clammy sweat, and my face pallid; I felt nausea, threatenings of diarrhœa, and the wretched prostration, physical and mental, which usually accompanies sea-sickness. After Mrs. H. left the deck for the ladies' cabin, and was thus beyond the reach of my care, I caused an ice-bag to be slipped down my back over my shirt and beneath my waistcoat, buttoned the latter and my coat over it, and pressed it against my back either by leaning against the bulwark as I sat, or by lying upon it. In a short time I felt very much better. But the continually over-dashing spray, which would not leave any of the after-deck completely free from its invasions, kept my feet and legs wet and cold, and thus induced me on one occasion, when I went below to learn how it fared with Mrs. H., to lay myself down in the only available berth in the cabin. The distance between my face as I lay and the deck above me was so slight as to add considerably to my feeling that the air of the cabin was very unpleasantly suffused with the products of respira-

tion, and that, notwithstanding the improvement which the ice had effected in me, I was becoming worse again. I therefore returned on deck; immediately afterwards I suddenly vomited once, but slightly and without any violent muscular effort, and the symptoms of diarrhœa having returned, took on one occasion an active form. I resumed my former position on the driest part of the deck, pressing the bag against my back as before; and the rising sun giving a little warmth to my feet doubtless contributed to my restoration. The cold sweat and nausea ceased entirely; my skin became warm; the bowels no longer felt uncomfortable; my physical strength returned; my mind became quite clear and active; and thus I lay on the ice until we reached Newhaven, watching the fleeting clouds and musing over the revolution in the treatment of a very large number of diseases which will probably take place when the power of influencing the circulation of the blood in all parts of the body by raising or lowering the temperature of the nervous centres along the back shall be generally known and understood.

Case XIV.—May 23, 1864. I went by the tidal train from Boulogne to Paris. In the compartment of the carriage in which I rode was a gentleman who complained of being far from well. In the course of conversation, finding that he was talking to a physician, he told me that some months previously, in consequence of his wife's serious illness, he had taken her to Italy, that urgent business matters compelled him to leave her there and to return to England; that her continued illness during his absence for several months, had caused him such anxiety, and had so preyed upon him, as seriously to impair his health; that he had lost his appetite, and suffered habitually from a sense of nausea; and that as he had just crossed the Channel (*en route* to join his wife), this nausea was now increased, and that altogether he felt very uncomfortable. I said to him, "Well, sir, if you will allow me to prescribe for you, and to dispense my own prescription forthwith, I will undertake to free you from the nausea from which you are suffering." Having obtained a few preliminary explanations as to the nature of the medicine to be prescribed and its *modus operandi*, he assented. I then took from within the ample folds of a Scotch plaid an ice-bag filled with ice, and placed it along the whole length of his back, and requested him to wrap himself well up, and to press the bag closely to him. He said he felt the cold agreeable and refreshing; in a few minutes

he said he felt better; before long he expressed his astonishment at finding all uncomfortable sensations, together with the nausea, wholly gone. He kept the bag on his back until the ice had melted and the water had become warm; said he had never felt so well for a long time, and begged to be allowed, if possible, to possess himself of the ice-bag, in order to continue availing himself of the virtue derivable from it. Having obtained my assent, he promised to write to me a report of his further experience in using the bag: but up to the present time this promise remains unfulfilled.

Case XV.—The following report is an extract from a letter, dated Harwich, July 18, 1864, and addressed to me by my son:—

"You will be surprised to hear of me icing any one, but I met a gentleman, Mr. B., on the pier the other day, and began to talk to him. I found he was going to start that night by boat, and was in a state of fear about sickness. I recommended him to apply ice, telling him how to do so. He said he would, and that as he was only going for a few days he would call and see me on his way back to tell me the result. He called to-day, and said that he put the ice on his *wife's* back after she had become sick, that she got better in about fifteen or twenty minutes, that he then took it off, and that *there was no return* of the sickness. He said the lady is always sick at sea, even in calm weather; fears the sea so much as to be in a fright the whole time, and that this time she was not frightened at all after the ice had been applied. I should add that it was almost calm, but there was a little swell from the wind of the day before."

Case XVI.—July 27, 1864. In a letter of this date, addressed to me from Harwich, by Mrs. C., occurs the following report:—

"I am glad to tell you that I have had an opportunity of testing your remedy for sickness, though not in my own person. Some people who are lodging in the same house with us had some friends to visit them, who came by the steamer from London. The landlady told me that the poor lady had been ill ever since she came, and late in the evening I heard a noise as if some one was very sick. I rapped at the door of my neighbour's sitting-room, and in answer to my inquiries, found that the lady had begun to be sick while on board, and had continued so ever

since; she was also much purged. Her husband, who was with her, was becoming alarmed. I showed him my ice-bag, and explained to him the nature of the remedy. He soon procured some ice, and I filled the bag; we got the lady to bed, and then put the bag on.

"I went to her in ten minutes and found her shivering. The weather being very hot they had taken the blankets off, and she had only a thin counterpane over her; they had given her some brandy and water, and that had caused her to be sick again. I covered her up with blankets, and she soon became warm and fell asleep with the ice on her back; this was about 10 o'clock. She had kept nothing on her stomach all day, so I said that she would probably awake hungry; accordingly she awoke at 4 o'clock very hungry and quite well; she ate a crust of bread and had a little brandy and water, and slept again. The next morning she said she felt quite strong and well. She said she was rather subject to what she called bilious attacks, which generally left her weak and with headache for some days; but upon this occasion, when her illness had been so much more severe than usual, she had no headache and felt quite well. Her friends were full of expressions of gratitude, and attributed the cure entirely to the wonderful bag."

Case XVII.—Sept. 10, 1864. A friend of mine, a Russian gentleman, who crossed from Dover to Ostend on his way to St. Petersburg, has sent me a report of his experiments during the passage. The following is a translation of his letter:—

"The sea was calm; I was therefore greatly disappointed; you know why: because I had but one victim—an Italian lady, with her husband. I was not sick, but suffered from headache. I applied the ice, which did me a great deal of good. The lady was very ill, just on the point of vomiting. Having two ice-bags filled with ice, I asked her husband to ask her if she would consent to have one of them applied, and in order to encourage her, showed her that I had one on my own back. She consented. She was so delighted, poor creature, she thanked me a thousand times. The ice made her quite well, and she went to sleep with it on her back. On awaking, she begged her husband to buy a bag for her like the one which I lent her. Afterwards, when the water of the melted ice had become warm, she began to be ill again, and was extremely vexed because there was no more ice. I gave her your address, but I did not part with the bag."

CASE XVIII.—The following is an extract from a letter addressed to me, June 3rd, 1865, by Dr. Hayle, of Rochdale:—"I recommended a patient about to cross the Atlantic to try one of your ice-bags for sea-sickness. The result was most satisfactory. He was never sick when wearing the ice-bag. Once he went without it, and then, and then only, was he sick."

CASES XIX., XX., and XXI.—Early in the month of August, 1865, a lady, accompanied by her son and daughter (whose ages were probably between fifteen and eighteen), called upon me to tell me of and to express her thanks for the benefit they had received from my remedy for sea-sickness. She stated that her children as well as herself were great sufferers from sea-sickness; that, therefore, learning of my discovery in Paris, they resolved to have recourse to it when returning to England. They crossed from Calais to Dover on Sunday, July 30, 1865, and at starting ice was applied along the whole spine of each of them. They lay upon the ice, and all three were quickly asleep, and continued sleeping until the ice was melted, when they found themselves within ten minutes steaming of Dover pier.

CASE XXII.—In the latter part of 1865, Mrs. Charles Darwin wrote to me, that her son had recently experienced the benefit of the spinal ice-bag, while passing from Holyhead to Ireland, "on a rough morning." She said, "He is very subject to sea-sickness, and is convinced that, without the ice, he would, on this occasion, have been very bad. He put on the bag soon after starting, when already disordered, and at once felt relief."

CASE XXIII.—Mrs. N., who when at sea, unless it is as calm as a lake, always suffers from violent sickness and extreme prostration; often also from cramps and diarrhœa, crossed from Boulogne to Folkstone.

During the previous day there had been such a strong gale that no steamer ventured out from either of those ports; and although when she crossed the wind had abated, the sea was still running very high. Immediately she got on board the steamer an ice-bag was applied, next the skin, along the whole spine. She lay upon the bag all the time during the passage. Meanwhile great care was taken to keep her warm. A hot-water bag was applied to her feet, and her head which, during sea-sickness, is liable to become remarkably cold—as is the case with many other

sufferers—was surrounded by a woollen shawl. She fell asleep about ten minutes after the vessel started, and notwithstanding the great roughness of the sea, she continued sleeping until woke up by the noise caused by the steam which was let off when the vessel reached the Folkstone pier.

This lady, who had been residing some time on the Continent, was only just recovering from a very severe illness when she crossed the Channel. She was so feeble that her medical attendants strongly disapproved of her intention to go to England, and one of them, a very distinguished physician, thought her resolve so recklessly imprudent that he not only refused to sanction it, but requested to be absolved from all responsibility in connexion with it. And he seemed to be justified, for she fainted from sheer weakness while being transferred from one vehicle to another before she was got on board the steamer. Nevertheless, she crossed the Channel when it was extraordinarily rough, without sickness, lay in tranquil sleep nearly the whole way, and on arriving at the Folkstone Hotel was enabled to enjoy her dinner much better than she had done for several weeks previously.

Case XXIV.—The following letter by Dr. Lee is extracted from the *Medical and Surgical Reporter*, published at Philadelphia.

"The case which I am about to relate is as conclusive as a single case can be, in regard to the great practical value of Dr. Chapman's discovery.

"Early in the present spring I was consulted by a young married lady as to the best means of preventing sea-sickness during a proposed voyage to Havana. She was a person of excitable nervous temperament and delicate organization; has suffered for a year past from uterine disease; during the winter had been subject to constant attacks of coryza and bronchial catarrh, and was then in the third month of pregnancy. I procured an eighteen-inch ice-bag, and gave her husband full instructions as to its use. It was first to be applied from the nape of the neck directly down the spine, as far as it would reach, all three compartments being filled. I avoided carrying it down to the lumbar region from the fear of producing uterine congestion. If severe headache, with flushed face and throbbing of the temporal arteries came on, the upper section was to be emptied of its ice—the others remaining full: and if pain in the chest supervened, the middle, or even the middle and lower ones were to be emptied, the upper one being full.

"The outward voyage was extremely calm, and our patient suffered only from slight nausea, which, however, was always relieved by the ice-bag. Emboldened by her seamanship and experience, and greatly benefited by her open-air life in Cuba, she determined on her return to make no use of the ice, but by remaining constantly in the fresh air on deck, to bid defiance to the enemy. Unfortunately for her resolution, but fortunately for the reputation of the treatment, the homeward trip was very different from the outward.

"No sooner did the steamer reach the mouth of the harbour than she struck a heavy cross sea, and from that time until they came into port, four days and a half, they were in very rough water.

"Mrs. —— took occasion, as they steamed down the quiet bay, to fortify herself with a good dinner, and on the strength of it went up on deck just as the vessel began to feel the waves.

"She soon became nauseated, and in half an hour was obliged to walk to the side of the vessel and relinquish the meal upon which so much dependence had been placed. This she was able to do unaided. In about fifteen minutes, however, being again called in the same direction, she could not walk without assistance. Violent and distressing retching now set in, with scarce a moment's intermission. She rapidly became prostrate, the blood leaving the head and extremities, which were very pallid and cold, and what was still more alarming, severe spasmodic contractions of the muscles of the extremities, with intense pain in the lower part of the abdomen, set in. I had warned her husband of the danger of abortion from the violent action of the abdominal muscles, and the ordinary remedies for sea-sickness having been exhausted in vain, he now became alarmed and resolved to apply the ice without further delay.

"Obtaining assistance he carried his wife, more dead than alive, and conscious of but one desire, as far as her anæmic brain was capable of consciousness, namely, that of being thrown overboard—down to the state-room, and had the ice-bag filled in all its compartments.

"The effects of its application were little short of miraculous. In three minutes the retching ceased and the spasms were calmed. In a quarter of an hour she had fallen into a quiet sleep; and in half an hour her hands and feet were of natural warmth, and her face had regained its wonted colour. In two hours she awoke, greatly refreshed, and ate two slices of

toast with a cup of tea, and from that time did not miss a single meal. At eleven o'clock that night, slight symptoms of disturbance returning, the ice was at once re-applied, with most satisfactory results, She slept peacefully all night, although the sea was very rough, finding no inconvenience from the cold poultice, *except when it happened to be pushed off the spine.*

"It was applied again before breakfast the following morning, and after this, about five minutes before each meal, being allowed to remain on until the ice was melted, usually about two hours. On the third day she began to experience some pain in the chest, and her husband removed the ice from the middle partition, with the result of its disappearance. A few times it was necessary to apply it between meals, or on going to bed, but generally the three applications daily proved sufficient. I have seen as yet no history of a case in which this method of treatment has been tried on a long voyage, as across the Atlantic. Dr. Chapman's cases were only during the few hours required to cross the Channels. Mine, I think, covers a greater length of time than any yet published; and I can see no reason why the process may not be successfully extended over twelve days as well as four, with proper care and management.

"BENJAMIN LEE, M.D.,
"109, South Broad-street, Philadelphia.
"*May 25th*, 1866."

CASE XXV.—The following report is extracted from a letter published by me, in the *Medical Times and Gazette*, August 3, 1867.

"A few weeks ago, a gentleman who had recently arrived from Shangai, and who came to consult me, gave me the following interesting particulars illustrative of the complete efficacy of the spinal ice-bag in a case of extraordinary severity:—An English merchant, residing at Yokohama, came home, married, and took his wife back with him as far as Shangai. During the voyage to that place she suffered so fearfully from sea-sickness, and had become so exhausted and shattered by it, that great fears were felt of the results of continuing the voyage to Japan. They consequently remained at Shangai during many weeks, hesitating to proceed. Fortunately Dr. Parker, who resides there and who was already acquainted with the therapeutical principles and practice which I have introduced, was treating patients by means of spine-bags, and recommended the lady in question to make use of

one of them, which he supplied to her, in order to enable her to continue her voyage to Yokohama without further suffering. I am told that the passage occupies five or six days, and that generally there is a brisk wind, and therefore lively sea, in that region. Dr. Parker subsequently received news of his patient, who arrived safely at her destination, and was informed that she found the spinal ice-bag most effectual in saving her from further sickness."

CASE XXVI.—Miss S., a great sufferer from sea-sickness, has been at sea about a dozen different times, and on no one occasion has she escaped without severe illness. On August 5, 1867, at 4 A.M., she left London Bridge by steamer for Boulogne. Four hours previously I supplied her with two twenty-inch spinal ice-bags filled with ice, and surrounded by a blanket and travelling rug. Of course, from the time the bags were filled to that when the steamer reached the mouth of the Thames, many hours elapsed, but still the ice was so far preserved as to save the patient from suffering, to the extent described in the following letter:—

"DEAR SIR,—I have used the ice-bags you were kind enough to lend me for my passage, and I have found them a great comfort. I was free from any sickness whatever as long as the ice was not entirely melted, and suffered but very slightly towards the end of the passage. Had it not been for your ice-bags, I am pretty certain that I should have had to suffer not only during all the time I was on the sea, but also to be prostrate and unfit for work or enjoyment during two or three days afterwards. This is the eleventh time I have crossed the Channel, and never before have I felt so fresh after a passage, and been so free from fatigue as I am to-day.

"Thanking you most sincerely for the personal comfort you have bestowed upon me through your discovery, and hoping that many more poor sufferers from sea-sickness may be relieved by it,

"I remain, yours very truly, R. S."

CASE XXVII.—In the autumn of 1867 I had the pleasure of making the acquaintance of an American lady who was then staying in London. She had with her a daughter, about thirteen years old, who is peculiarly liable to sea-sickness, from which she suffers very severely. The lady herself having had a thoroughly sound medical education, is especially qualified to test the value of the

spinal ice-bag as a remedy, and as she was about to take her daughter across the Atlantic she had a favourable opportunity for doing so. I therefore urged her to give the ice-bag a trial. On reaching New York she wrote to me, Nov. 16, 1867, as follows:—

"We had a very rough tedious ocean trip, and Florence was quite ill notwithstanding the fact that ice to the spine would arrest her sufferings very quickly. Owing to the fact that one of our stewardesses was a novice, and very ill herself a good part of the time, and that a much greater number of passengers than usual were ill, it was simply impossible to secure the ice properly prepared with any regularity, and often not at all when most needed, though the child promptly gave notice when *she thought* the ice half melted. She invariably fell asleep soon after the application, and appeared to rest sweetly, though retaining the characteristic pallor of sea-sickness to a marked extent. I feel sure that she might have been kept quite comfortable if we could have commanded the ice, because in the few instances that we were able to have a second filling of the bag before the first was exhausted, there was very little vomiting and no straining whatever, or headache."

CASE XXVIII.—Nov. 4, 1867. A gentleman wrote to me as follows:—"Mrs. —— *iced* herself in crossing to Ostend, in June, but in coming over from Calais to Dover the week before last, she was obliged to cross without her ice-bag. On the former occasion [the longer passage] she *escaped*; on the latter, though she bore up very heroically for an hour and a half, she succumbed at last. We had a rough passage."

CASE XXIX.—Lady —— consulted me on account of sea-sickness in Nov., 1867, when about to cross the English Channel. She suffers greatly when at sea, not only from sickness, but headache and mental obscuration or confusion. I prescribed the use of the spinal ice-bag, and directed her how to use it. She called upon me again, July 30, 1868, and stated that by using the bag she was free from sickness while crossing the Channel, and that meanwhile her head remained painless and clear.

CASE XXX.—The lady whose report is given in the preceding case also informed me that she lent her ice-bag to one of her lady friends who was about to cross the Channel, and who is a victim to sea-sickness, from the distress of which she too was saved by means of the ice.

Case XXXI.—A friend of mine gave me the following information. A lady of his acquaintance crossed from Kingstown to Holyhead in the latter part of 1867. Several ladies in the cabin were sick, but one lady who remained quite well excited considerable interest in consequence of her application to her spine of a long, black, queer-looking thing, which proved to be a spinal ice-bag. Being questioned about it, she said that she had occasion to pass between England and Ireland very often; that when doing so she had always suffered dreadfully from sea-sickness until she had acquired the spinal ice-bag then on her back, but that by using it she had now crossed the Irish Channel several times without being ill at all, so that whereas formerly she looked forward to the passage with terror, she was now enabled to go on board the steamer with perfect confidence that her ice-bag would keep her completely out of danger of her old enemy. And, in fact, she was thoroughly lively and joyous, while most of her fellow-passengers were prostrate with sickness.

Case XXXII.—My brother, resident in Glasgow, wrote to me May 20, 1868, as follows :—"About a fortnight ago a lady called, when I was out, and stated that she had just come from America, and had used one of your ice-bags all the way, and had quite escaped the sea-sickness. Had I been in I should have asked her name, and got a precise statement of her experience of the remedy."

Case XXXIII., reported to me by Mr. Irvine, Surgeon.—"Mrs. M., æt. 35, a nervous and delicate lady, the wife of a cotton broker, applied to me for advice on the eve of a passage from Liverpool to Dublin, and made the following statement:—'I have to cross over to Dublin to-night, and am in dread lest I should lose my life through the sickness and spasm from which I always suffer at sea. I have crossed four times, and was never so ill in my life as on each of those occasions. I am compelled to make this passage, but do not think I shall survive it unless something can be suggested for my relief. I am almost driven mad by sickness before the ship has been at sea an hour. I was advised when making my last passage to lie down when the vessel set sail, and to continue in the recumbent posture, but in two hours I became awfully ill, and continued to be sick, until the boat landed.'

"I candidly told the lady that I had no belief whatever in any

remedy as a cure or preventive of sea-sickness, but that she might use the spinal ice-bag, in favour of which, as a remedy, I had heard so much. The patient readily consented to use the ice, and I requested her to inform me of the result, which was undoubtedly most satisfactory:—'I went to bed,' she reports, 'as the steamboat started, with an ice-bag fixed to my spine by means of my dress. Very shortly I was asleep, but, the weather being rough, I frequently awoke during the succeeding three hours, at the lapse of which time I first began to feel discomfort: then I applied a second bag, after which I again slept, and did not awake until we were in Dublin Bay, when I not only felt, but was, quite well. During the passage home I did not go to bed, but by renewing the ice to my spine every three hours I kept quite free from sickness.'

"JOHN W. IRVINE,

"Honorary Surgeon to the Liverpool Dispensaries,
"Senior Surgeon to the West Derby Union Hospital."

CASE XXXIV.—Dr. J. Waring-Curran, of Bacup, Manchester, published the following statement in a letter to the editor of *Public Opinion*, June 20, 1868, in answer to an inquiry for a remedy for sea-sickness:—"If your correspondent will have one of Dr. John Chapman's spinal ice-bags, applied as he directs along the spinal column, he will have nothing to fear from sea-sickness. A young lady, a patient of mine, suffering from pulmonary consumption, one of whose distressing symptoms was nausea and vomiting, at my solicitation went to a southern climate. The great objection was the sea-sickness which was dreaded. A spinal ice-bag was procured, and the voyage undergone without the slightest symptoms of sea-sickness having been evinced."

CASE XXXV.—A Canadian gentleman who had previously consulted me, called upon me August 3, 1868, immediately after crossing the Atlantic from Halifax to Liverpool, and mentioned to me the following illustration of the effects of the spinal ice-bag which he had with him, and which, as he is not liable to sea-sickness, he was able to lend.

A gentleman passenger who was on board the steamer in which my informant came to England was "pretty sick," and consented to test the value of the ice-bag. He was in his cabin and was laid upon it. It quickly soothed him into sleep, which continued until after the ice was melted. On the following

morning he rose without sickness and continued free from it during the day.

Case XXXVI.—"Dear Dr. Chapman,—I have great pleasure in telling you how thoroughly successful your spinal ice-bag was in preventing the misery of sea-sickness the only time I have had the opportunity of trying its effect. I shall certainly never again go to sea without one.

"I am as bad a sailor as any one can possibly be: even if the sea be calm, within ten minutes after I have left land my sufferings begin; a rougher sea of course aggravates them. I have crossed the Channel some twelve times, and though the degree of illness has varied, I have always suffered from intense pain in the limbs, accompanied with vomiting, usually continuing till I fainted. I always feel and look very ill for some time afterwards, and the voyage is often followed by sharp attacks of diarrhœa, to which complaint I am not otherwise subject.

"The last time I crossed from Dover to Calais I got one of your bags, and had it filled at the Lord Warden Hotel without difficulty, and put it on there. It was a roughish day, but to my surprise I had not a symptom of sea-sickness. At first I laid down on deck, but I was able to sit up soon and enjoy the passage, for the first time seeing the cliffs of England and France from the sea. On my return, though the sea was calm, I wished to try the ice again, but could procure nothing but iced water at Calais, this I wore, and as long as it remained cold I felt all right. About half way over, as the water became warm, the old symptoms gradually came on, and I was getting as bad as usual when we landed, but had I had ice I am sure, from the partial effect of the water, I should have escaped altogether.

"I remain, yours very truly,

"*September* 15*th*, 1868." "A. M.

Case XXXVII.—J. K., a gentleman who has been acquainted with my method of preventing sea-sickness from the time when I made my first experiments in treating it, has himself repeatedly tested the efficacy of the spinal ice-bag as a remedy for the malady. As a general rule he suffers when at sea unless it is calm, not only from extremely prostrating sickness, but from diarrhœa. During recent years he has passed from England to the Continent and back again several times; on each occasion he has provided himself with an ice-bag ready for use, and whenever

there was any motion of the steamer in which he crossed he applied the bag as directed. He sums up his experience of its effects by saying:—If he puts it on before he feels sick or overcome with languor it keeps him well, and that if vomiting, diarrhœa, and the accompanying prostration have come on before the ice-bag has been applied, he feels almost immediate relief, and that in a short time he is so completely recovered as to be able to take food and enjoy it.

Each of the following testimonies is based on an experience of numerous cases, and therefore, as evidence of the efficacy of the remedy in question, is far more important than any of the preceding reports.

Captain White, commander of one of the Newhaven and Dieppe boats, stated to me in a letter dated November 22, 1864, that though he had some difficulty in persuading passengers to try the remedy, all who did try it were benefited.

Mr. S. M. Bradley, while acting as surgeon of one of the steamers of the Cunard service, running between Liverpool and New York, published in the *Lancet* of December 3, 1864, a letter from which the following is an extract:—

"*In severe cases, where other remedies have failed,* I have very generally found it (the spinal ice-bag) do great good. I have applied it to young children, delicate women, and old people. In no case does it do harm; but in the great majority of instances it soothes the nervous irritability which so commonly accompanies sea-sickness, induces sleep, and so enables the stomach to receive light food, and consequently relieves exhaustion. . . . . I order it to be kept on a couple of hours; though, if the patient sleeps, as is often the case, I never remove it until after waking."

One of my patients informed me in August, 1868, that Dr. Thompson, medical officer of the steamer *City of Cork*, one of the Inman line of Atlantic steamers, uses the spinal ice-bag in treating his sea-sick patients, and that according to his own statement he finds it a thoroughly efficacious remedy.

It will be observed on glancing through the foregoing evidence that eight members of the medical profession have recommended or made use of the spinal ice-bag for stopping sea-sickness; as yet, however, I know of only two instances in which the medical

officers of large passenger steamers have had recourse to them. Their opportunities of testing the remedy are so great that it is much to be regretted they do not assure themselves of its value and give the benefit of it to the many sufferers constantly coming under their care. Knowledge is diffused so slowly that very likely the great majority of these seafaring doctors have not yet heard even of spinal ice-bags, and certainly have no idea of the principles of their action: medical men who are ignorant of a remedy can scarcely be expected to prescribe it. But, unhappily, the *vis inertia* of ignorance is not the only conservative element which the promulgator of a new doctrine and practice has to contend with: there is a vast number of men whose minds are so perversely constituted that being unable either to discern new facts or apprehend new truths, and complacently believing therefore whatever is unknown to themselves is non-existent, exemplify in their lives that sublime creed of conscious stupidity—

Whatever is true is not new,
Whatever is new is not true.

The opposition of these men is truly formidable, for their opposition is not that of ignorance passive, but of ignorance active. Not long ago a gentleman, who has occasion to make an Atlantic voyage frequently, and who is interested exclusively on public grounds in testing the spinal ice-bag as a remedy for sea-sickness, found that passengers generally were indisposed to try it. On one occasion, however, a gentleman whose sufferings were unusually severe and prolonged, begged to have it applied; the bag was at hand and there was ice on board the steamer; but besides the willingness of the patient, the proffer of an ice-bag, and an abundance of ice, one thing more was wanting—the consent of the doctor: unfortunately for the patient he was inexorable! He resolutely opposed the use of the bag; declared it to be dangerous; that holding the responsible office he did, he could not allow the risk of the proposed application to be incurred; and that if his strongly-expressed opinion were disregarded by the patient, he must be prepared to bear the consequence of his rashness.

In October, 1867, a gentleman supplied an ice-bag to a lady who was about to go abroad. Recently I wrote to him to inquire whether she used the bag, and if so, with what result. He replied: "My young lady friend sailed to Santa Martha in South America, and was awfully ill; but the doctor on board advised against trying the ice! Case of donkey!"

But, indeed, it seems that in some cases doctors may run the risk of losing their appointments by prescribing spinal ice-bags for their sea-sick patients. A doctor did this on board a steamer forming part of a well-known fleet, and one of its proprietors becoming aware of the fact, exclaimed, "Who is this man who thus dares to experiment on the passengers? Let him be dismissed the service at once!"

It has been stated, on the best authority, that proprietors of passenger steamers are not likely to look with favour on any proposal to prevent the passengers from being sick, for that in estimating the cost of carrying them—across the Atlantic, for example—the fact that a certain average proportion of them will be sick, and therefore without appetite for an average number of days during each passage is taken into account, and that were sea-sickness prevented or materially lessened, while the scale of fares remains the same, the profits of the proprietors would be reduced. If the objection embodied in this statement,—which, indeed, was made to me on behalf of proprietors both in Liverpool and London,—really has any weight at all, it may be easily counterbalanced by a re-adjustment of the scale of fares charged for passengers by the different lines. In any case, however, this and all other objections not actually insurmountable will have to give way when once the travelling public becomes distinctly assured of the reality of the discovery here described. Sea-sickness is a misery which few persons will endure when they know that by a very simple process, which promotes pleasurable feelings while it cures, they can escape that misery. When selecting the vessels in which they go from place to place, they will refuse to go by those which do not carry an abundant supply of ice, and the solemn professional advice of those diploma'd gentlemen who oppose the use of the remedy merely because they know nothing about it, will be simply ignored. Steam-boat proprietors, and doctors too, are, after all, but servants of the public: its will is their law, and only by obeying it can they continue to live. This truth contains ample security for the practical application of the doctrine here explained and illustrated.

THE END.

DR. CHAPMAN'S SPINE-BAGS

(PATENT),

FOR

THE TREATMENT OF DISEASE

THROUGH THE AGENCY OF

THE NERVOUS SYSTEM,

BY THE APPLICATION OF

DRY COLD AND HEAT ALONG THE SPINE.

SPINAL ICE-BAG.

"*The* ICE-BAG, *which has evidently been constructed with a great amount of thought, is divided into cells, and closed by a very ingenious clamp. Its arrangements enable it to be worn by persons moving about. The* WATER-BAG *consists of two parallel india-rubber tubes for the application of hot or cold water on either side of the spine. The bags are intended to enable the practitioner to carry out those 'vaso-motor nerve' views of the treatment of disease which were enunciated by Dr. Chapman in this journal July* 18, 1863." —MEDICAL TIMES AND GAZETTE, *July* 23, 1864.

The Spinal Ice-Bag, when applied in appropriate cases, is **soothing** and **agreeable,** as well as curative. (See Statements of facts, pages 12, 13, and 14 of this Circular).

SPINAL WATER-BAG.

Among the many diseases over which, by means of Dr. Chapman's discoveries, a remedial control has been acquired is the important group consisting of **Functional Diseases of the Stomach,** and comprising those hitherto incurable maladies—**Sea-Sickness,** and the **Sickness associated with Pregnancy.** For evidence that

SEA-SICKNESS

MAY NOW BE

PREVENTED AND CURED

See the following pages—2, and 18 to 22.

[*N.B.—Copies of this Pamphlet are supplied gratis by the Agents named at page* 3.]

WORKS BY DR. CHAPMAN.

Just published, in 8vo., price 2s. 6d.

Sea Sickness, and How to Prevent it;

An Explanation of its Nature, and Successful Treatment through the Agency of the Nervous System, by means of the Spinal Ice-bag. With an Introduction on the General Principles of Neuro-therapeutics. Second Edition.

[The work contains reports of Thirty-seven Cases, proving that Sea-Sickness is both preventable and curable by means of the Spinal Sea-bag. Its application is agreeable (See pages, 12, 13, and 14 of this Circular); it gives immediate comfort and relief; while arresting the sickness, as well as any cramps or spasms which may be experienced, it restores the impaired circulation of the blood to its normal standard; and thus the patient, who may be cold, pallid, apathetic, and completely prostrate, quickly regains the ruddy glow and the mental and physical energy of health.]

"Certainly, so far as the history of these voyages across the Channel goes, it is highly in favour of the author's ingenious recommendations. . . . . We advise, both for practical and theoretical purposes, that the pages of this pamphlet be carefully perused."—*Lancet*, March 4, 1865.

"I had some difficulty in persuading passengers to try it (the spinal ice-bag), but those who did were benefited."—*Capt. White, Commander of one of the Newhaven and Dieppe boats.*

"*In severe cases, where other remedies have failed,* I have very generally found it (the spinal ice-bag) do great good. I have applied it to young children, delicate women, and old people. In no case does it do harm; but in the great majority of instances it soothes the nervous irritability which so commonly accompanies sea-sickness, induces sleep, and so enables the stomach to receive light food, and consequently relieves exhaustion. . . . . I order it to be kept on a couple of hours; though, if the patient sleeps, as is often the case, I never remove it until after waking."—*Letter of S. M. Bradley, Surgeon, Cunard Service, in the "Lancet,"* December 3, 1864.

"The following is an extract from a letter addressed to me, June 3rd, 1865, by Dr. Hayle, of Rochdale:—'I recommended a patient about to cross the Atlantic to try one of your ice-bags for sea-sickness. The result was most satisfactory. He was never sick when wearing the ice-bag. Once he went without it, and then, and then only, was he sick.'

"The case (in question) is as conclusive as a single case can be, in regard to the great practical value of Dr. Chapman's discovery. . . . . The effects of the application of the Ice-bag were little short of miraculous."—*Report of "Case of Sea-Sickness successfully treated by Ice to the Spine."* By B. Lee, M.D., in the Philadelphia *Medical and Surgical Reporter.*

PREPARING FOR PUBLICATION,

Neuralgia, Headache, & kindred Disorders:

Their Nature, Causes, and Treatment. With illustrative Cases.

Now ready, in 8vo., price One Shilling,

Chloroform and other Anæsthetics:

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DR. CHAPMAN'S SPINE-BAGS

(PATENT),

FOR

THE TREATMENT OF DISEASE

THROUGH THE AGENCY OF

THE NERVOUS SYSTEM,

BY THE APPLICATION OF

DRY COLD AND HEAT ALONG THE SPINE.

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AND MAY BE HAD BY ORDER OF ALL DRUGGISTS.

THESE bags are of two kinds, each being also varied in size according to the requirements of the patient.

One kind, used chiefly for the application of ice, is divided into two, three, or more cells, either by external clamps or by internal septa, in order to hold the ice or iced-water in apposition with the whole or any part of the back, the patient being enabled to remain upright or to walk about meanwhile. The mouth of each of these bags is closed by a clamp. The other kind, used chiefly for the application of heat, but also of moderate degrees of cold, consists of two parallel tubes, a little distance apart, and communicating at top and bottom, the mouth of the bag being closed by a screw.

THE SPINAL ICE-BAGS vary in breadth from two to four inches and a quarter, the shortest bag being the narrowest, and the longest the broadest. Their lengths and prices are as follows:—

8 inch	6*s.* 6*d.*	suitable for children.
10 „	7*s.* 6*d.*	
12 „	8*s.* 6*d.*	
14 „	9*s.* 6*d.*	suitable for youth of both sexes.
16 „	11*s.*	
18 „	12*s.* 6*d.*	
20 „	14*s.*	suitable for women.
22 „	15*s.* 6*d.*	
24 „	17*s.*	suitable for men.
26 „	18*s.* 6*d.*	

Lumbar Ice-bag, 8*s.* 6*d.*

THE SPINAL WATER-BAGS are in respect to size and price as follows:—

6 inch	5*s.* 6*d.*,	suitable for youth of both sexes.
8 „	6*s.* 6*d.*	suitable for adults of both sexes.
10 „	8*s.*	
12 „	9*s.* 6*d.*	
14 „	11*s.*	

For a description of the PHYSIOLOGICAL PRINCIPLE on which the remedial method of modifying the temperature of the nervous centres along the back is based, see Dr. Chapman's medical works, the titles of which are given at pages 2, 23, and 24 of this circular.

The Introduction to the pamphlet on Sea-sickness, as well as the Introduction to the volume on Diarrhœa and Cholera, contains a *general* exposition of Dr. Chapman's discoveries, of his neuro-pathological doctrines, and of his "New Method of Treating Diseases by Controlling the Circulation of the Blood in different Parts of the Body;" while each of his works abounds in *special* examples of the practical application of that method.

The leading features of Dr. Chapman's therapeutical system are indicated in the following extract from the letter of the Paris Correspondent, published in *The Times*, Nov. 6, 1865:—

"At a meeting of English physicians in Paris at the house of Sir Joseph Olliffe, M.D., Physician to the English Embassy, Dr. John Chapman, of London, has given an exposition of his discovery of a new method of treating disease by controlling the circulation of the blood in different parts of the body, through the agency of the nervous system. This he does by cold or heat, or both together, applied along the spine. Having referred to the fact that the arteries are surrounded by muscular bands, and that these bands, forming

collectively what is called the muscular coat, contract and dilate at the bidding of nerves emanating from an assemblage of nervous centres, or ganglia constituting 'the great sympathetic,' he showed that these ganglia can be so influenced by suitable applications of cold or heat on each side of the spine as to cause them to effect either the contraction or dilatation of the arteries which they govern, and that the spinal cord itself can be influenced in the same way and can thus have the circulation of blood in it, and therefore its functional activity, increased or decreased at the will of the physician. The doctor then gave an account of the therapeutical consequences of his discovery, which are nothing less, according to him, than a revolution in the science and art of medicine. One result is the abolition of the distinction between what are ordinarily called diseases of the nervous system and almost all diseases of the rest of the body. He insists that the latter as well as the former are diseases of the nervous system—symptoms of an excess or deficiency of blood in the nervous centres; that, for instance, diseases of the chest, abdomen, and pelvis are as truly diseases of the nervous system as are epilepsy, paralysis, or insanity, and consequently can be treated most successfully by modifying the temperature of the appropriate part of the nervous region along the back—thus correcting those circulatory and functional disturbances in the nervous centres acted on, which constitute the proximate cause of the disease in question. The lecturer gave an explanatory account of a large number of diseases which he had treated by this method. Congestions of all parts, except in the nervous centres themselves, he subdues by applying to the appropriate part of the spine a neat little double-columned india-rubber bag filled with hot water. The reverse condition, deficiency of blood—anæmia, he remedies by means of ice, also in an india-rubber bag, of still more ingenious construction. Fevers of all kinds, including cholera, he treats both by cold and heat—cold in the cold stage, heat in the hot; and affirmed that heat along the spine will cause the pulse to fall, and will induce perspiration—abolishing, in fact, the feverish condition. Convulsive affections, he said, are far more amenable to his method than they are to the drugs commonly used in their treatment. He said he had cured several cases of epilepsy, and that that remarkable and not seldom fatal disease, false croup, as well as infantile convulsions, may be controlled and cured by means of ice. He mentioned two cases of apoplexy in which the use of cold and heat along the spine had been extraordinarily successful, and expressed the opinion, founded on experience, that various forms of paralysis and cerebral affections, including insanity, may be treated by his method with far greater success than by any other. He remarked that pleurisy is singularly amenable to heat along the spine; that bronchitis in its first stage may be cut short, and that in the secondary stage the profuse secretion in the bronchial tubes may be arrested. Spitting of blood and pulmonary hæmorrhage can, he said, be speedily arrested by the proper application of heat between the shoulder-blades. His own experience on this point was confirmed by that of Professor Beneke, of Marburg, who, in the *Archiv für wissenschaftliche Heilkunde*, reports that by adopting Dr. Chapman's method he caused the rapid arrest of pulmonary hæmorrhage in an obstinate case of long standing. Adverting to stomach affections, he described the pathology of sea-sickness, and the sickness of pregnancy—maladies which he has proved to be curable by means of ice, and expressed the conviction that all kinds of symptomatic vomiting may now be controlled to

a surprising degree. Bowel affections, including both diarrhœa and constipation, he declared to be not less tractable; he referred to several cases of partial paralysis of the bladder which he had cured. The latter half of the lecture consisted of an exposition of the lecturer's doctrines concerning the nature and treatment of cholera. He arranged the symptoms of the disease into eight groups, discussed them in succession, then referred to the *post-mortem* phenomena, and finally described in detail the treatment he adopts. He maintained that the essential nature of cholera consists of extreme hyperæmia or congestion of the spinal and sympathetic nervous centres, and showed that every feature of the disease is explicable on this hypothesis. Congestion of these centres causes spasm of the arteries all over the body, as well as perspiration—the veins meanwhile remaining full; hence the coldness, dark colour, cold sweat, and shrunken aspect of the skin. The same congestion cuts off the supply of blood from the organs generally, hence the muscular debility, the sudden and general prostration of strength, and weak pulse, becoming imperceptible. The same congestion causes contraction of the cerebral arteries; hence, though there is often vertigo, faintness, apathy, there is rarely delirium; the intellect remains clear, however feeble, so long as it retains its functions. The congestion of the spinal cord produces the extreme restlessness, tossing, and intolerance of the bed-clothes—observable in some cases, as well as the spasms of the voluntary muscles—and the convulsions which sometimes occur. The difficult respiration, sunken or suppressed voice, and cold breath, he traces to the twofold congestion above-mentioned. The most striking part of his doctrine is that, perhaps, which accounts for the abundant 'rice-water' evacuations from the stomach and bowels. His treatment of the disease is a logical consequence of his conception of its nature: he overcomes the stage of collapse by ice along the spine, and heat to the rest of the body, especially the extremities and afterwards averts any dangerous consequences from the reactionary fever by appropriate applications of heat to the spine itself. Meanwhile, he watches for every opportunity of getting food into the patient as soon as it can be retained. The lecture, though a long one, was listened to with attention and interest, and the lecturer received the thanks of the auditors who assured him that they should each make trial of his therapeutical method."

The great remedial efficacy of the Spine-bags was attested in the course of a debate on a paper entitled "The Treatment of Epilepsy: Principles and Practice," which was read by Dr. Chapman to the Medical Society of London, March 18th, 1867.* The following are extracts

* The concluding part of this paper, published in *The Medical Press and Circular* of April 3, 1867, shows how the numerous affections frequently associated with epilepsy and contributing to usher in the attacks, may be treated with extraordinary success by Dr. Chapman's peculiar method, through the agency of the spinal ice-bag, and contains the following summary of remarkable cases, in which the fits ceased either immediately, or very speedily, after the first application of the spine-bag:—

"H. M. suffered from little fits, occurring generally about twice a day. I began to treat her Feb. 24th, 1863: at the end of a fortnight the attacks quite ceased, and up to April 24th, 1865, when I last saw the patient, had never recurred.

"C. T., male, had violent convulsive fits, recurring, on an average, his wife said, three times a day. I began to treat him May 16th, 1863: the fits ceased from that day until August of the same year, when he had one. Up to March, 1864, when I last heard from him, he had not had another.

"S. G., male, suffered from little fits, each consisting of a period of unconsciousness,

from the summary of the debate published by the *Medical Press and Circular* of April 3rd, 1867.

"Dr. Routh could not refrain from adding his testimony to the great importance of the subject which Dr. Chapman had brought before them that evening. He said he had been to some extent a pupil of Dr. Chapman, and had witnessed his treatment of certain cases at the Samaritan Hospital. The result was the production of certainty in his mind of the truth of Dr. Chapman's doctrine, viz., that the circulation and nutrition of remote parts, or of the periphery of the body, may be increased by the application of ice along the spine, and may be decreased by the application of heat to the same region; also, that the functional activity of the spinal cord may be depressed or exalted in the same way. *These facts, he repeated emphatically, are thoroughly established and indisputable. Being so, they opened up the prospect of a great therapeutical revolution.* Every one must see this who bears in mind the very large proportion of diseases which may be treated most successfully by increasing or decreasing the circulation and nutrition of

preluded by a shriek. They recurred about a dozen times a day. I began to treat him June 10th, 1866: on the following day he had four fits; each, however, being unaccompanied by a shriek, and since then he has never had another.

"Miss D. had convulsive fits, recurring several times a month. My treatment of her began January 10th, 1864: she had one attack during a week when treatment was omitted, and none afterwards up to July 9th, 1864, the last date at which I heard of her.

"H. C., female, had convulsive fits about three times a month. She came under my care Nov. 24th, 1864: she had two fits in January, 1865, and since that date she has not had one.

"K. E., female, had violent convulsive fits, from twelve to twenty a month. She was first seen by me December 9th, 1865: during the first two months of treatment she had five fits; since that time she has had none.

"S. T. J., male, had convulsive fits, varying in number from about six to ten a month. I began to treat him November 16th, 1865: he had one fit in January, 1866, and has had none since.

"F. A., male, suffered from falling fits, occurring about once a week, from 'swooning,' which occurred many times a week, and very frequently from giddiness. He consulted me for the first time, February 12th, 1866; up to April 23rd, when I last saw him, he had not had one falling fit, and the swooning and giddiness had quite ceased.

"Mrs. A. suffered from fainting-fits of long duration and varying frequency, with successive coldness of the surface of the body during the attacks, five or six of which occurred during the ten days previous to coming under my treatment, which began August 24th, 1864: she had one fit during the first week of treatment, but afterwards never had another.

"Mrs. C., a patient in King's College Hospital, under the care of Dr. Playfair, suffered from fainting-fits, occurring about eight times a week, sometimes oftener, and sometimes lasting an hour at a time. Dr. Playfair treated her by bromide of potassium and valerianate of zinc successively, but the fits continued as bad as ever. The spinal ice-bag was then applied—December 22nd, 1865: during the first week of its use she had only three fits, but afterwards, up to the last date of the report which Dr. Playfair kindly gave me, she had no further attack.

"H. R., male, 5 months old, first seen by me July 13th, 1863. Had had fifteen attacks of convulsions during the previous month, five of which had occurred during the previous two days. There was great cerebral congestion, and the child having been treated vigorously by means of calomel, and blisters to the back of the head, was given up as a hopeless case by the medical attendant. By the use of the spinal ice-bag the child was instantly soothed, and was soon completely recovered; he has never been convulsed since. He has been under my care at times subsequently on account of other disorders of the nervous system, from which he was quickly relieved; and only a few days ago he was reported to me by his father as being quite well.

"I could adduce a considerable amount of additional evidence in proof of the astonishingly great therapeutical potency of the spinal ice-bag in treating the convulsive affections of children; and when it is borne in mind that in England every year about 24,000 children under five years of age are destroyed by convulsions alone, and that in a large proportion of cases the epileptoid diseases of adults originate in the convulsions of infancy, the value and importance of the method of treatment in question can scarcely be over-estimated."

the parts morbidly affected; indeed, he did not hesitate to express the belief that even cancer might be beneficially treated by this method, and was confident that surgeons might derive great aid from it in various cases coming under their cognizance, especially when atrophy or hypertrophy was a leading symptom. In confirmation of his statements, he said the method had been tried in a case of what he called 'convulsive action of the stomach,' associated with pregnancy. The patient suffered from sickness continually, for nearly three months; it was no use giving her drugs, for they came up again directly. She had been supported to some extent by injections per anum, but was in such a state of exhaustion that the question of inducing abortion, in order to stop the sickness, was entertained. By Dr. Chapman's advice the spinal ice-bag was applied. The immediate effect was the production of refreshing sleep; by continuance of the treatment, the sickness steadily and completely subsided, and the patient is now well and gaining flesh. Dr. Routh said he had tried the method in a case of profuse menorrhagia: after the double column hot-water bag had been applied during an hour, the flow ceased. He had also tested the principle in cases of infantile convulsions. In one case the child had twelve convulsions in one day, and of course, under ordinary circumstances, could not, he said, be expected to recover: the convulsions ceased as soon as the spine-bag was applied, have never recurred, and the child is now quite well."

* * * * *

"Dr. Rogers hoped that further experience of the application of Dr. Chapman's views would finally prove them true. His own experience tended in that direction. One of his children had convulsions during thirty-six hours: ice applied to the spine completely stopped the fits. And quite recently, in two cases under his care, of whooping-cough followed by convulsions, the convulsions ceased to recur after the spinal ice-bag was applied."

* * * * *

"Dr. Edmonds also mentioned a case of tetanus, particulars of which he has published, in which he applied ice along the spine, and rescued the patient from seemingly impendent death. She had been previously treated by two other medical men in the course of the eighteen hours during which the disease had been progressing, but without benefit."

THE SPINAL ICE-BAGS have been proved to be especially efficacious in the treatment of—

Headaches due to Cerebral Anæmia.

Fainting Fits, and all forms of local Anæmia, except that of the spinal region itself.

Tetanus.

Epilepsy and **Epileptoid Diseases,** as well as the disorders from which epileptics often suffer during the intervals of the attacks.

Puerperal Convulsions.

Infantile Convulsions.

Laryngismus stridulus, and other nervous disorders incident to dentition.

Cramp of both voluntary and involuntary Muscles, and, notably —**The Cramps of Cholera.**

Paralysis of various kinds.*

Amaurosis when due to spasmodic constriction of the retinal arteries.

Neuralgia.

* *The Medical Press and Circular* (May 1st, 8th, 29th, 1867) published a paper by Dr. Chapman, entitled "PARALYSIS: CASES ILLUSTRATIVE OF A NEW METHOD OF TREATING IT BY THE APPLICATION OF COLD OR HEAT ALONG THE SPINE," which he read at a Meeting of the Harveian Society of London, April 4, 1867. The following is a brief abstract of some of the Reports of Cases contained in that paper:—

1. Mrs. P., aged forty-two, first seen, March 30, 1863. Cannot utter any distinct articulate sound. The tongue is shrivelled, and the tip of it cannot be protruded beyond the teeth. Saliva dribbles continuously from the mouth, both night and day. The muscles of the face, neck, upper extremities, and especially of the forearms and hand, as well as those of the whole back are extremely thin and wasted. The patient has considerable difficulty in swallowing solids; and can scarcely swallow fluids at all: she takes them in very small quantities, and even then always spills a part of anything she attempts to drink,—"it comes back," as her nurse says. Her head falls forward on her bosom; the arms and hands are almost powerless. The thighs are slightly flexed on the trunk, powerfully adducted, and nearly immovable, so that when the patient is seated she cannot prevent herself from slipping out of her chair. The forepart of each foot is bent downwards, and firmly fixed in that position; and the toes and sole of the left foot are drawn inwards. The patient experiences much giddiness, is habitually constipated, and the catamenia, though regular, are very scanty. The treatment was continued till nearly the end of May, 1863, when the patient left London. The results are stated to have been as follows:—The patient could hold her head erect, could protrude the tip of the tongue beyond the teeth full half an inch; could speak much more distinctly; could swallow fluids without difficulty—being able to drink a cup of tea or coffee at a draught without spilling any of it—and the dribbling of saliva had quite ceased. The upper extremities had increased in size, had become much stronger, and the claw-like set of the fingers had disappeared. The power of voluntarily flexing the thighs on the trunk, of separating them from each other, and of moving them freely in all directions, had returned. She could put her feet flat on the ground, and could move them outwards as well as inwards by the mere force of her will. She stood occasionally two or three hours at a time, supporting herself sometimes only with one hand, and, one day, with the help of her son, walked into an adjoining room. The muscles of the back re-acquired considerable development, and, in fact, she gained flesh generally to such an extent as to cause the nurse to complain of the additional weight when moving her about. The bowels acted more regularly, the catamenia became abundant, and the head quite free not only from headache but from the great giddiness which she had experienced during the whole period of her illness (about two years and a half) before the treatment in question began.

2. H. C., male, aged fifty-six, first seen June 16, 1863. The right arm is partially paralyzed. The patient can stand by himself with difficulty, but cannot walk without support and the use of a stick. Both legs are equally weak. The toes of the left foot are turned inwards as he sits, and he cannot evert them. Both hands are numb. Speech very thick and indistinct. Makes water at his best times, about every fifteen minutes, at his worst, about every five minutes. The bowels are usually opened about every third or fourth day. The patient sleeps a considerable part of each day, as well as night; complains that his head is heavy and dull, and that he is "cold all over," and suffers especially from coldness of the hands and feet, even in the hottest weather; he sits close to the fire in summer. He has a severe epileptic fit about once a month.

The patient was under treatment about ten weeks, and during that time his right arm became much stronger; he was enabled to walk alone, even without the aid of a stick, to evert the left foot, and to speak very much more distinctly; his intelligence and mental expression were greatly improved; the numbness and other disorders of sensations, as well as his headache and drowsiness in the day time, vanished; he became not only warm all over, but "very hot;" his bowels were open daily; his power of retaining his water so increased that he was obliged to get up only twice, or at most thrice, during the night; and, finally, whereas before treatment he had an epileptic fit about every month, one did not occur until nearly three months after the treatment began.

3. H. R., male, aged two years and eleven months, was first seen "on account of staggering, and so much weakness of the lower extremities, that when he attempted to walk, he stumbled, and frequently sank down. His mind was so impaired, that it was difficult to elicit from him any answers to questions, or to excite in him any interest in outward objects; he could not see distinctly, and was unable to see to pick up coins, if thrown down on the ground before him; the eyes seemed as if almost fixed in the orbits, and the pupils were remarkably immobile. He was also troubled with profuse dribbling of saliva." By the end of March, "every symptom from which the child had suffered, except the dribbling

Bronchorrhœa, when unaccompanied with inflammation.

Asthma.

Indigestion, Nausea, Sick-headache, Sea-Sickness, the Sickness of Pregnancy, and symptomatic vomiting generally.

Flatulence, Meteorism.

Chronic Constipation.

Diarrhœa of all kinds.

of saliva, had completely disappeared. By persistence in the use of the ice, as last ordered, this trouble was soon also overcome, and the child has long continued well in all respects."

4. A. P., male, aged two years and four months, suffering from paralysis, with rigidity of the four extremities, was first seen April 10th, 1866. "The arms were stiff, though still partially movable. The legs were extended and rigid; the feet being also firmly fixed as in *talipes equinus*. The body and four limbs were swollen; the dorsum of each foot so much so as to make the skin tense and glistening. There were also slight ecchymoses on the feet. The sensibility was extremely heightened: touching the hands or feet caused the child at once to scream; in fact he screamed if he saw his feet approached. He also suffered from diarrhœa." "Immediately after the treatment began, the child was soothed, slept well the following nights, and rapidly became generally calmer and better. On the 12th the fingers had become more supple; the extremities could be freely handled without causing pain, and the diarrhœa had ceased. By the 25th he could walk the length of a room, and by the 2nd of May he was able to walk with perfect ease, and, indeed, had completely recovered, except that there was a slight eversion of the left foot, which has since disappeared."

5. A girl suffering from paraplegia, and under the care of F. Broughton, F.R.C.S., Surgeon-Major, Bombay Army, while on furlough at Hastings during the autumn of 1863. Mr. Broughton, in a letter to Dr. Chapman writes,—"The case had been pronounced hopeless. I found her incapable of turning in bed, all motion and sensation absent from a little above the knees downwards. There was great tenderness of the spine in the lower cervical and in the dorsal region. General health was good, menstruation natural. I applied ice to the spine daily with frictions, and in ten days sensation commenced in the feet, followed by slight motion. Steady improvement has taken place. She has risen from her bed, and on Christmas-day I had the satisfaction of meeting her walking in the village-street of Orr, in which she resides, at No. 3, Caroline Place."

6. During the night of Dec. 2nd, 1864, a gentleman became alarmingly ill, and was first seen by Dr. Chapman the next morning, and was found in a state of deep stupor: "he could not be roused, the right arm and leg were paralyzed, the leg less completely so than the arm. When the hand was pinched severely there was no evidence of sensibility." From the time the treatment began "the patient steadily improved day by day. At the end of a week he was talking with facility; on the 23rd of the next month he walked between one and two miles two days in succession, and in February reported himself quite well."

7. A stout woman, aged sixty, first seen March 14th, 1865. Was struck with apoplexy two days previously, and had lain during the interval of forty-eight hours profoundly unconscious, the head and face being strikingly cold and deathlike; the rest of the body was also cold. Within fifteen minutes of the first application (of heat in the first instance) to the spine the forehead became quite warm, and before twenty-four hours had elapsed, the whole body was warm, and the same day her consciousness had been so far recovered that she appeared to recognise her daughter. From that date she steadily progressed in intelligence, and began to gain some power on the paralyzed side; but owing partly to the neglect of her nurse, sloughing over the sacrum came on unperceived, pyæmia followed, and, three months after the date of the apoplectic attack, proved fatal.

8. A boy, aged thirteen, was first seen June 1st, 1863, when unable to use his left arm, which he could not raise above his head. The fore-arm could not be extended, and was firmly fixed in the pronecondition. Thehand was powerfully drawn to the ulnar side, and firmly flexed on the fore-arm; the thumb was fixed in the palm of the hand, the fingers being rigidly closed over it. The patient could not stand on the left leg, and when the heel was on the ground, could not lift up the fore-part of the foot. He suffered from head-ache on an average three days a week. Bowels constipated. The whole of the left side habitually cold. By the end of July the power of the whole of the left arm had greatly increased; the hand had become straight in relation to the forearm, the fingers and thumb capable of complete extension. The left leg and foot had correspondingly improved; the bowels had become open daily; the left side had become remarkably warm, and during two months of treatment the previously long persistent headache was never felt.

Other cases of paralysis, the relief of which was not less striking than that exemplified in the foregoing abstracts are given in the paper from which these are taken, but it is impossible within the limits of this circular to give additional examples of the success attendant on the treatment of paralysis by the method in question.

[For an explanation of the seemingly paradoxical but established facts that both chronic constipation and diarrhœa are cured by one and the same process, see Dr. Chapman's works.]

Cholera prior to the stage of reaction.

Irritability, Spasm, and Paralysis of the Bladder. Incontinence of Urine.

Functional disorders of the generative system, both male and female, among which are excessively frequent *emissio seminis*, certain forms of impotency, amenorrhœa, dysmenorrhœa, and leucorrhœa.

Coldness of the lower extremities.

THE SPINAL (HOT) WATER-BAGS are used successfully in the treatment of those diseases which, in so far as the vascular system is concerned, are of a nature precisely opposite to that of the diseases already mentioned, and which, therefore, are characterised by hyperæmia in some one of its numerous grades ranging from slight plethora to intense imflammation. Examples:—

Feverishness and Fever.—[Dr. Chapman says, in the Introduction to his work on Diarrhœa and Cholera, p. 15, "I have had but slight experience in the treatment of fever, but I anticipate that fevers of all kinds will be most effectually controlled by cold along the spine in the cold stage, when the blood-vessels are contracted, *and heat in the hot, when they are relaxed.*"]

Cholera during the stage of reaction.

Headache and functional disorders of the brain, when accompanied with Cerebral Hyperæmia.

Cerebral Congestion.

Apoplexy, if treated immediately after the "stroke."

Amaurosis, when its immediate cause is congestion of the retinal blood-vessel.

Epistaxis.

Neuralgia, of a certain kind.

Coryza. Influenza.

Bronchitis, } In their early stages.
Pleurisy, }

Hæmoptysis.

Pulmonary Congestion.

Pulmonary Hæmorrhage.

Dysentery.

Hæmorrhage from the bowels.

Hæmorrhoids.

Menorrhagia, and other forms of **Uterine Hæmorrhage.**

Of course, the proper treatment of these various diseases by the application of cold or heat along the whole or some special segment of

the spine can only be practised by those physicians who first make themselves thoroughly acquainted with the principles of neuro-physiology, neuro-pathology, and neuro-therapeutics. Moreover, while the first requisite for the successful practice of any remedial method is a correct diagnosis of the disease in question, an accurate appreciation of the essential nature of the disease about to be treated by modifying the temperature of the spinal region is absolutely indispensable; for an erroneous diagnosis, instead of indicating a remedial procedure, will probably do exactly the reverse, and will thus result in augmenting rather than curing the malady.

The Soothing and Comforting Effects of the Spinal Ice-Bag.

Many persons are terrified by the mere idea of having ice applied along the spine, and probably the majority of persons think it a painful process. But it is not so, and indeed, so far from being so, patients availing themselves of the treatment generally like it, and many crave or welcome it as an agreeable source of relief and comfort. In Dr. Chapman's work on "Diarrhœa and Cholera" (p. 44) he reports a case of a child suffering from severe choleraic diarrhœa, who was treated successfully by the almost continuous application of the Spinal Ice-bag, and of whom his mother said, "He sleeps every time the bag is put on; he seems to like it; he holds his head down to let the bag be put on directly I tell him the bag is coming, so I think it must be a comfort to him." At page 47 of the same work, Dr. Chapman says,—

"While I write, a note (dated July 31st, 1866) has just reached me from a physician who is making extensive use of Spine-bags in Scotland. He says: 'One thing has struck me much since I wrote you last, namely, the liking that sensitive, chilly patients have for the cold bag to the spine, although frightened to think of it before they make trial.' In 1863 Dr. Druitt came to my house to see the result of my treatment of paralyzed and epileptic patients, of whom he saw five. He subsequently wrote me a letter, giving his impression of what he had seen. After confessing that he was agreeably surprised at the results of my treatment, and stating that 'there was no mistaking the testimony of the patients that those results had been most beneficial,' he observes, '*I learned from all the patients that the treatment had made them more comfortable; I mean as regards their general feelings of health and animal sensations, without reference to the relief of particular symptoms.* In my own practice, I lay the greatest stress on this point. It is true that some methods of treatment are ultimately beneficial, although they may be most repulsive or nauseous, and give great discomfort and *malaise* for the time; but it will not be denied that, *cæteris paribus*, that treatment is most likely to do good which shall seem congenial to the whole feelings, whilst meanwhile the patient is saved much annoyance and misery.'"

It is in fact difficult to imagine that a remedy which relieves suffering,

and in many cases causes the patient to sleep, can be otherwise than soothing and agreeable; and that the Spinal Ice-bag does these things is attested by an amount of evidence which makes doubt of its effects in these respects impossible. Referring to its application as a remedy for sea-sickness, Mr. Bradley, surgeon to one of the Atlantic steamers of the Cunard service, says (in a letter to the *Lancet*), "I have applied it to young children, delicate women, and old people. In no case does it do harm; but in the great majority of instances it soothes the nervous irritability which so commonly accompanies sea-sickness, induces sleep, and so enables the stomach to receive light food, and consequently relieves exhaustion. . . . . I order it to be kept on a couple of hours; though as the patient sleeps, as is often the case, I never remove it until after waking." And Dr. Benjamin Lee, of Philadelphia, in an account of a case of extremely severe sea-sickness (during a passage from Cuba to Philadelphia) treated successfully by the Spinal Ice-bag, says, "The effects of the application of the Ice-bag were little short of miraculous. In three minutes the retching ceased and the spasms were calmed. In a quarter of an hour she [the patient] had fallen into a quiet sleep; and in half an hour her hands and feet were of natural warmth, and her face had regained its wonted colour. In two hours she awoke, greatly refreshed, and from that time did not miss a single meal. . . . . She slept peacefully all night, although the sea was very rough, finding no inconvenience from the cold poultice, *except when it happened to be pushed off the spine.*"

The following evidence of the soothing and agreeable effects of the Ice is extracted from the reports of the *Experiments* published by Dr. Chapman in his pamphlet on "Sea-Sickness," of the efficacy of the Spinal Ice-bag in curing that disease:—

Case I.—"I think nearly every one was sick, and I, the usually most of all, not only not sick, but even well, feeling as if I were in a cradle, being rocked by the gentle hands of a tender nurse. . . . I don't know of course the effects of ice on a long-continued voyage, but I venture to believe that the feeling of perfect comfort would continue as long as the ice is kept on." Case II.—"She felt the cold to the back peculiarly grateful, but wished it more intense; the bag was therefore placed next the skin. This change delighted her." Case IV.—"In about ten minutes after the vessel started she became violently sick, the muscular effort being so extreme as to cause her to say 'Oh, doctor, I think my heart is coming up!' I applied ice along the entire spine as quickly as possible, when she was *instantaneously* relieved, and then lay down upon the ice soothed and calm." Case VI.—"About twenty minutes before reaching Boulogne, the ice in the bag was so nearly melted as to cause her to feel that the refreshing and sustaining influence of the cold was lessening; I therefore placed an additional bagful of ice outside her dress, and over the bag already supplied; this sufficed to restore the agreeable sensations she had hitherto enjoyed, and to continue them until she landed at Boulogne." Case IX.—"During the second two hours (of the passage to Dieppe) she was fast asleep—lying on the ice. . . . She was particularly impressed with the relief afforded her by the ice, from the great suffering in

the head which she had always experienced before when at sea." CASE X.—"After lying upon the ice, both her sickness *and headache* ceased entirely." CASE XI.—"She was lying down very sick, and complained especially of an acute headache. She was laid on a bag of ice, the bag being next the skin. The head became quite free of pain in a few minutes. . . . Still lying on the ice, she fell asleep. In about half an hour she awoke quite well, and continued so." CASE XII.—"Having put on an ice-bag, I continued to feel ill about fifteen or twenty minutes, and then rapidly recovered: all nausea, sweating, and chilliness ceased; the colour returned to my face, as observed by the Captain and some of the passengers; the troublesome threats of diarrhœa and uncomfortable sensations in the bowels passed away, and I continued quite well—really enjoying the remaining five hours of the passage to Dieppe. I wore the ice nearly the whole of the time." CASE XIV.—"He said he felt the cold agreeable and refreshing; in a few minutes he said he felt better; before long he expressed his astonishment at finding all uncomfortable sensations, together with the nausea, wholly gone." CASE XV.—"The lady fears the sea so much as to be in a fright the whole time; this time she was not frightened at all after the ice had been applied." CASE XVI.—"She soon became warm, and fell asleep with the ice on her back. She awoke very hungry, and quite well." "CASE XVII.—"She was so delighted, poor creature, she thanked me a thousand times. The ice made her quite well, and she went to sleep with it on her back."

A little reflection by those who acquaint themselves with the *modus operandi* of the Spinal Ice-bag will, in fact, suffice to explain not only how it produces comfort, but how it cannot fail to do so when it is applied in suitable cases, and when it is applied rightly. It is not designed for the healthy, but for the sick, and only for that portion of the sick in whom has become established precisely that morbid condition of the circulation of the blood in the nervous centres which the application of cold is of all agents the most capable of subduing. Hence in these cases, and in these only, inasmuch as the Spinal Ice-bag subdues a morbid condition in the very citadels of life—a condition in which the phenomena of the disease in question originate, and inasmuch as the cold restores the circulation of the blood in those nervous centres to its normal state without contaminating or embarrassing the system with any medicines, it seems *à priori* that such physiological changes must inevitably be accompanied with sensations of comfort and pleasure, as experience shows them to be. Moreover, it must be borne in mind that the ice does not come in direct contact with the surface of the body, which is shielded from it by a layer of india-rubber; and that, as this is a bad conductor of heat, the full effects of the cold are not felt suddenly, but gradually, and therefore that nothing of the nature of a shock is produced when the bag is applied.

These remarks are precisely applicable, *mutatis mutandis*, to the use of heat by means of the Spinal Water-bag; but as, even in the first instance, patients do not shrink from its application, there is no need to adduce proofs that its use in suitable cases is comfortable as well as curable.

Directions for selecting a suitable Bag in each Case.

When an **ICE-BAG** is wanted for any particular patient, one should be chosen which will extend from the second or third cervical to the third or fourth lumbar vertebra, or from the nape of the neck to the lower part of the "small" or hollow of the back. It is exceedingly important that the cold should not (unless in certain cases for special reasons) extend on to the base of the skull, and even more indispensable that it should not reach over any part of the sacrum.

If it be desired to apply ice to a portion only, say a third, of the spine, it is of the utmost importance that a bag of suitable width be used. Ice applied in one of the small-sized bags to the back of an adult would not produce an adequate effect; whereas, applied to the back of a child in one of the large-sized bags, it would probably, by its great lateral extension, exert a depressing and otherwise injurious influence.

When it is necessary, in cases of children and youths, to apply ice to a part only of the spine, a bag of suitable size for the patient in question, supposing ice were about to be applied to the whole spine, should be selected; then, if only a third of the spine, no matter which part of it is to be acted on, the upper cell of the bag should be filled with ice, and applied where intended, the remainder of the bag being allowed to hang loosely, or folded up behind the cell which is used; if two-thirds of the spine is to be acted on, the upper two cells of the bag should be filled with ice and applied to the appropriate part, the lower cell remaining empty and dependent, or folded upwards behind the cells in use, in the same way as when only one cell is used.

In applying ice to a limited part of the adult spine, either a spine-bag of suitable size for an adult should be used in the manner just indicated, or a short bag, called the "Lumbar Ice-bag," consisting of only two cells, and designed especially for the application of ice to the lumbar region, may be conveniently adopted.

THE SPINAL WATER-BAGS, excepting the one of the smallest size, are all of one width, and are all alike intended for adults. The length therefore of the bag which it may be desirable to employ for the application of heat (or of moderate degrees of cold) in any particular case, must of course be determined by the medical attendant of the patient. It may, however, be well to state that the 8-inch Water-bags are especially adapted to act on the head by their application along the upper third of the spine, and on the pelvic viscera—the womb especially—by being applied along the lower third of the same region. The 10-inch bag is chiefly useful for the application of heat along the dorsal vertebra in the treatment of chest affections, and the longer bags (12

and 14 inches) are designed, of course, to control larger areas of the body at one time, as in cases of fever, and especially *in cases of cholera during the stage of reaction.*

Directions for preparing and applying the Spinal Ice-bag.

Put ice (broken into pieces about the size of a nut or small walnut*) into the opening of the bag, on the side nearest to the loops, until the contents of the lowest cell reach up to the bottom of the second cell; then put ice in the middle opening until it reaches up to the bottom of the third cell; and, finally, fill the top cell. Then close the bag with the clamp, *placing it on the thickened, band-like part around the mouth,*† and letting the screws be on the same side as the loops of the bag. When the clamp is properly applied, a very moderate pressure by its screws is needful to make the bag water-tight. All pressure beyond what is needful injures the bag. Care must be taken that each cell is not so filled as to cause it to become round, otherwise only a small portion of the bag will touch the back. It is also expedient that the contents of the several cells should only slightly overlap each other.

In applying the bag, place the smooth side of it in apposition with the back, the side bearing the loops being turned outwards. The bag may be kept in its position in various ways. If it is intended to be used for only a short time, or if the patient be in bed, the best plan is to lie upon it, taking care that it is exactly along the centre of the back. If the patient should wish to move about, pass the elastic band round the head, in order that it may hold the upper cell close to the back of the neck, and sustain the bag by fastening the clothes tightly outside of it; or pass a long tape through the lower loop, carrying each half of this tape over the shoulders, crossing one over the other in front of the chest, carrying them backwards round the waist, in order to clasp the bag closely into the small of the back, and then, bringing them forward, tie them in front. The bag will thus be sustained, and without allowing any of its weight to depend from the head. In this case the patient may move or walk about without any discomfort while wearing the bag.

As ice contains a considerable amount of air, this air, as the ice melts, accumulates at the top of the bag, and being a bad conductor of heat, prevents the still unmelted ice which it surrounds from exerting its intended influence: it is therefore necessary to unscrew the clamp occasionally, in order to let the air escape, and, if the bag is to be worn for a considerable time, to replace the air by a little fresh ice.

* This is most easily done by means of an "ice-breaker," supplied by ironmongers, and consisting of a tapered piece of steel, sharp-pointed, and fixed in a handle.

† These words are printed in italics in the hope of emphasizing the injunction they contain as strongly as possible. Many persons apply the clamp beneath the band, where, as there are two layers of india-rubber less than there are above, it is necessary to screw it more tightly than is needful when the clamp is applied on the band, in order to make the bag water-tight. By thus wrongly applying the clamp, its undue pressure is liable to cut the bag, and so destroy it.

Ice may usually be procured of any fishmonger; but patients who may need to use the spinal ice-bag for a considerable time will find it best to buy a quarter or half cwt. of ice at a time. The best ice may be had at from 6s. to 8s. per cwt., and may be kept in a refrigerator or common box. A refrigerator or ice-safe not only excludes the outer air from the ice, and thus retards its melting, but it is at the same time a domestic luxury. Ordinary refrigerators of various sizes, capable of holding from a quarter to one cwt. of ice, are sold by ice-merchants and ironmongers; but "The Filtering Refrigerator, Ash's Patent," sold at 315, Oxford Street, deserves especial mention; for it combines all the advantages of an ice-safe, in which ice, and edibles by means of it, may be preserved, wines cooled, &c., with that of a filter: it is so constructed that the water which is produced by the melting ice is prevented from becoming tainted by anything put into the safe, or by its metal lining, and is passed into a stone filtering vessel at the bottom of the safe. By this excellent arrangement, the filter supplies perfectly pure water for drinking purposes so long as pure ice is kept in the safe.

Ice can, however, be so kept as to retard its melting without the aid of a refrigerator. For this purpose it should be placed in a wooden box having holes in the bottom, and so supported as to permit the water to drain away from it, and the ice should be surrounded with an abundance of sawdust. Another convenient plan is to place the wooden box, arranged as just mentioned, within a zinc one, from which the water produced by the melting ice can be drawn by means of a tap at the bottom, or a hole closed by a screw cap. The wooden box must be so much smaller than the metal one that there may be a considerable stratum of air between the two. In this case the sawdust can be dispensed with. This plan has the advantage of enabling the ice to be kept in the patient's room. Boxes of this kind are also to be had at 315, Oxford Street. Whatever plan is adopted, the more the box containing the ice is surrounded with some substance which is a bad conductor of heat—a blanket, carpet, or some straw, for example—the more slowly the ice will melt.

Directions for applying the Spinal Water-bag.

Fill the bag with water of the required temperature, and apply it directly to the appropriate part of the back, keeping it in its place in any way most convenient to the patient. This may be most easily done by lying upon it, or by pressing the bag between the back of a high-backed chair and the appropriate part of the spine. When the bag is applied in the dorsal or lumbar region only, it may also be sustained by merely fastening the dress tightly over it. In applying the bag in the lumbar region, ladies most usually keep it, as well as the Lumbar Ice-bag, in its place in this way, and can thus freely walk about during the application.

The Spinal Water-bag is used for the application of Heat, and also of Cold of any degree above that of freezing-point, in cases where it is desirable, while influencing the sympathetic ganglia on each side of the spinal cord to affect the spinal cord itself as little as possible; but its chief use is for the application of Heat.

For the latter purpose the temperature of the water put into the bag may vary, according to the requirements of the case in question, from 110° to 120° Fahrenheit. In the great majority of cases in which the application of heat is desirable, the water used should not be of a higher temperature than 120°; *and the lower the temperature of the water used consistently with effecting the object for which it is applied the better for the patient.* When it is necessary to continue the application, the water should be changed about every 30 or 45 minutes. Of course, the more the bag is shielded from the surrounding air by materials which impede the passage of heat—as woollens or a feather pillow—the longer it will keep hot.

Sea-Sickness prevented or cured by the Spinal Ice-Bag.

In his work on "SEA-SICKNESS," Dr. Chapman states that, "the doctrine of the excito-motor or reflex functions of the spinal cord is a guide to the whole physiology of sickness," and that, "following it," he "was led to predict how to prevent, arrest, or control, not only sea-sickness, but, also, how to remedy or palliate every kind of sickness, whatever may be its *primary* cause."

"I hold," he adds, "that the *proximate* cause of sea-sickness consists in an undue amount of blood in the nervous centres along the back, and especially in those segments of the spinal cord related to the stomach and the muscles concerned in vomiting. This condition is induced by the movement of the vessel, in, I believe, three ways:—1st, through the brain; 2nd, through the ligaments of the spinal cord; 3rd, through the abdominal and pelvic viscera."

"If, by one or several causes, the amount of blood circulating in the spinal cord be increased considerably beyond the normal amount, all the nerves emanating from it partake of the increased activity of the cord itself, and convey from the centre to the periphery of the nervous system an abnormally large number of exciting impulses. Those parts of the body which are subject to the will—the purely voluntary muscles—resist these impulses most easily; and only in extreme cases, therefore, are their ordinary functions deranged; but the involuntary or purely organic functions, being unsustained by cerebral influence under the direction of a dominating will, have their usually regular and tranquil life easily disturbed and thrown into confusion by the unwonted number of exciting impulses transmitted to them from the preternaturally excited spinal cord."

Dr. Chapman also explains how the cold sweat, and the copious secretion of mucus often ejected from the stomach, are due to excessive stimulus from the spinal cord, which he affirms to be the efficient cause of glandular action; and maintains that those occasional phenomena of sea-sickness, cramps, or spasms—proceeding in rare instances to convulsions—are also due to hyperæmia of the cord. To a like condition of the sympathetic nervous centres he refers the deadly pallor, the physical

weakness, mental prostration, and indifference, which in degrees ranging from mere *malaise* to such vital depression as to imperil life itself, form a part of the malady; and, in his elaborate monograph on the disease, he demonstrates, step by step, how the ship's movements cause an abnormally large afflux of blood in the nervous centres, and how, that condition having been induced, all the phenomena of sea-sickness are originated by it. "The inevitable conclusion," he says, from all the facts and arguments of his exposition of the pathology of sea-sickness, is that "the only scientific and really effective remedy for the disease must be one which has the power of lessening the amount of blood in the whole of the nervous centres along the back. This," he has proved, "can be effectually done by lowering the temperature of the spinal region by the application of ice. A formidable looking remedy," he admits, "but when it is judged of by the aid of experience, it ceases to terrify, and on the contrary, is found decidedly agreeable. Ice applied in bladders or by any of the ordinary methods would undoubtedly occasion great discomfort, would constrain the movements of the patient, compelling him to remain for the most part in one position, and in fact, could not be so applied as to insure success." But the application of ice along the spine, in the spinal ice-bag expressly devised by Dr. Chapman for the purpose, is liable to none of these objections. "It is necessary," he says, "*first*, that the ice be kept in contact with each region of the spine, the upper portion of the ice being prevented from falling down as the melting proceeds; *secondly*, that the application do not extend far on each side of the spinal cord, otherwise the patient will become cold; *thirdly*, that, having regard to the comfort of the patient, the mouth of the bag containing the ice be so effectually closed as to prevent the water from escaping as the ice melts; *fourthly*, that the mouth of the bag be as wide as the bag itself, in order that the bag may be easily and rapidly filled; and, *fifthly*, that, without any inconvenience to the patient, facility should be afforded for giving escape to the air which accumulates in each compartment of the bag as the ice melts."

The Spinal Ice-Bag is so constructed as to fulfil all these requirements, and if only it be prepared and applied in the manner directed at p. 16 of this circular, it will be found not only an efficacious but a thoroughly and easily practicable remedy for the hitherto incurable malady in question.

It is of the utmost importance that in each case the traveller should provide himself, or herself, with a bag of suitable length and width. It should extend from the second or third cervical to the third or fourth lumbar vertebra, or from nearly the top of the neck to the lower part of the "small" or hollow of the back. It is especially necessary that the cold should not extend to the base of the skull, and even more indispensable that it should not reach downward over any part of the sacrum. The width of each bag bears a certain proportion to its length, so that if in each case one of suitable length be selected, its width will be suitable also.

In ordinary cases it will suffice to apply the ice-bag as soon as the patient finds himself becoming ill. "In such cases the degree of cold requisite for stopping the sickness will most frequently be obtained if the bag be placed outside the shirt or chemise, and in some cases even outside the flannel vest, when such garment is worn. I have satisfied myself, however," Dr. Chapman says, "that *in all cases it is much the best to let the ice come in direct contact with the skin.* Patients of preternatural sensibility in the spinal region, or who are unusually liable to sea-sickness, ought, not only to apply the spinal ice-bag direct to the skin, but also for a considerable time—say half an hour, or even an hour —before they go on board ship. So long as the liability to sickness continues, cold must be applied as directed. In cases of preternatural sensibility, while the patient is on board the ship, should there be any motion, and should the tendency to sickness have not completely subsided, it will be necessary that the ice be kept to the back *without the intermission of even a few minutes*, so speedily does the excess of blood recur in the nervous centres while the motion of the ship continues. In order to insure the unintermitted application of ice, such sensitive patients ought to be provided with two bags, so that one can be replenished with ice and ready for immediate application before the other is removed."

"Experience will teach them that there seems almost as if there were a wonderful intelligence in the nervous centres of the whole spinal region, which denotes by quickly expressive and unmistakable feeling the exact parts where the application of ice is most desirable, and where it should be omitted. I recommend all who use it to attend to these intimations as trustworthy oracles."

All persons intending to practise this method of protecting themselves from sea-sickness will do well to acquaint themselves with all the directions in detail and the reasons for them given in Dr. Chapman's work on the subject; but it is especially desirable that invalids should do so in order that they may learn how, while applying the spinal ice-bag, they may observe such precautions as their peculiar conditions may render indispensable. It may, however, be stated here, as a general rule, that so long as the application of the spinal ice-bag is agreeable, its influence will be beneficial. Usually "patients not only find the cold pleasant, but crave that it should be more intense:" in such cases they will act judiciously in complying with the indication. Moreover, as already intimated, they should regard "their feelings of the comparative agreeableness of the cold in different parts of the back as a reliable guide to those particular points where, from constitutional peculiarities, the abnormal afflux of blood in the nervous centres is the greatest, and which therefore, they instinctively desire should be rendered coldest."

It has now been proved by experience in numerous cases of sea-sickness that, as a general rule, if Dr. Chapman's directions for its cure be carefully complied with, the application of the spinal ice-bag will give immediate comfort and relief: "the sickness will stop; if diarrhœa is present, it will be subdued; if the patient is only threatened with it,

the attack will be averted; if there be headache, with coldness of the forehead, the pain will vanish; the cold clammy sweat will cease to be exuded; the cold skin will become warm again; any cramps or spasms which may be experienced, will be arrested; the muscular system will regain its usual strength; the mind will recover its energy and pleasurable interest in surrounding objects; and the sickly pallid features will resume their expressive energy and healthy hue."

"Until ice shall be habitually kept on board passenger-vessels, persons liable to sickness must of course continue to suffer, unless they provide ice for themselves; to do so, except for short passages, would be difficult; but for passages of a few hours only, each passenger may easily supply himself with the requisite quantity of ice. Each bagful when applied to the back melts in about two hours, faster or slower, of course, according to the temperature of the weather. For the passage between Dover and Calais one bagful suffices; one will also suffice between Folkestone and Boulogne, unless in cases of peculiar severity. Between Newhaven and Dieppe three bagfuls are required; between Dover and Ostend two. As the Channel steamers do not yet carry ice, passengers who intend to use it between Dover and Calais, or between Folkestone and Boulogne, will save themselves trouble by having a bag properly filled in London, and then packed in a mat or carpet-bag, or any other convenient vehicle, surrounded by an abundance of sawdust or several folds of a thick woollen rug or other woollen material. Shawls, flannel vests, or petticoats, and woollen coats, with which the traveller's carpet-bag may happen to be provided, will answer the purpose quite as well, and, if so used, the only addition to the luggage is the ice-bag with its contents. Thus packed a short time before the train starts from London, it may be conveyed to Dover or Folkestone ready for immediate use, the ice having melted very slightly meanwhile. For passages of several hours, unless two or three ice-bags be taken on board, prepared and packed as above, it is necessary to take a supply of ice packed in plenty of sawdust by the ice-merchant, and an ice-breaker, by which it may be reduced to fragments as wanted. From two to three pounds of ice for every two hours during which the passage lasts would be the quantity required by an adult."

It is said that the steamers belonging to the Peninsular and Oriental Company, and those plying between England and the United States, already carry a supply of ice. When passengers suffering from sea-sickness learn how easily and safely they may traverse the ocean in defiance of their enemy, they will choose only those vessels which do carry an adequate store of ice; and hence, the owners of all steam and sailing ships employed in passenger traffic, will be constrained by self-interest to supply them, as an indispensable part of their stores, with a quantity of ice sufficient to insure each passenger against the malady, which though rarely proving fatal, still terrifies and prostrates a large proportion of the hundreds of thousands who travel every year by sea.

In Dr. Chapman's work on sea-sickness, he has reported the results

of seventeen experiments in which the spinal ice-bag was used to avert or cure the malady, and, as *The Lancet* observes, "certainly, so far as the history of these voyages across the Channel goes, it is highly in favour of the author's ingenious recommendations."

The following are abridgments of the reports of five of these "Experiments":—

EXPERIMENT I.—Mdlle. H., who had crossed the Channel several times previously, and of whom Dr. Chapman testifies that he never saw a person suffer more from Sea-sickness, left Dover for Calais, February 9th, 1864, and applied one of Dr. Chapman's Ice-bags during the passage. She afterwards wrote—"I think nearly every one was sick, and I, the usually most of all, not only not sick, but even well, feeling as if I were in a cradle, being rocked by the gentle hands of a tender nurse. . . . We reached Calais, and I had not experienced the slightest nausea."

EXPERIMENT II.—Mrs. H., who usually suffers extremely when at sea from sickness and intense headache, and who on two occasions had a series of epileptic fits induced by the ship's motion, crossed from Folkestone to Boulogne, May 12th, 1864, one of Dr. Chapman's Ice-bags being applied to her back during the passage. She reached Boulogne without any sign of sickness. This lady made five passages subsequently, using ice each time, and was confirmed in her conviction of the great efficacy of Dr. Chapman's method of treating the malady, from which she is an extraordinary sufferer.

EXPERIMENT IX.—Mdlle. G., who has been six times at sea, and who on each occasion, before using the Ice-bag, suffered much from sickness, crossed from Newhaven to Dieppe, May 27th, 1864. She applied an Ice-bag during the whole passage, and reached Dieppe without experiencing the least sickness.

EXPERIMENT X.—Mrs. G., while crossing from Newhaven to Dieppe, June 10th, 1864, was very ill, vomited bile frequently, and complained of intense headache. Dr. Chapman applied ice along her spine: her sickness and headache ceased entirely, and she reached Dieppe continuing well.

EXPERIMENT XI.—Miss C., while crossing in the same boat with Mrs. G., June 12th, 1864, was lying down very sick, and complained especially of acute headache. Dr. Chapman placed an Ice-bag along her spine as she lay, the bag being next her skin. In a few minutes her head became quite free from pain. While lying on the ice she fell asleep, and in about half an hour awoke quite well, continuing so until she reached Dieppe.

In his work on *Diarrhœa and Cholera*, Dr. Chapman says—"I have received numerous assurances since my pamphlet on sea-sickness was published, from persons who have availed themselves of my discovery, that they found it an effectual remedy," and then gives several reports, for abstracts of which see page 2 of this Circular.

But "it is obvious," he observes in his pamphlet, "that much more experience is requisite before our knowledge of the power of ice in stopping sea-sickness, and of all the essential particulars of treatment, can be complete." He therefore expresses a hope that travellers who make trial of the remedy will favour him with reports of their experiments. While thus obliging him they will also be doing a public service. Such reports may be addressed direct to Dr. Chapman, 25, Soho Street, Portman Square, London.

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